

THE IRON AGE

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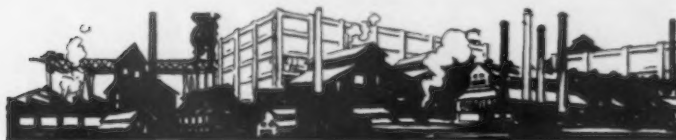


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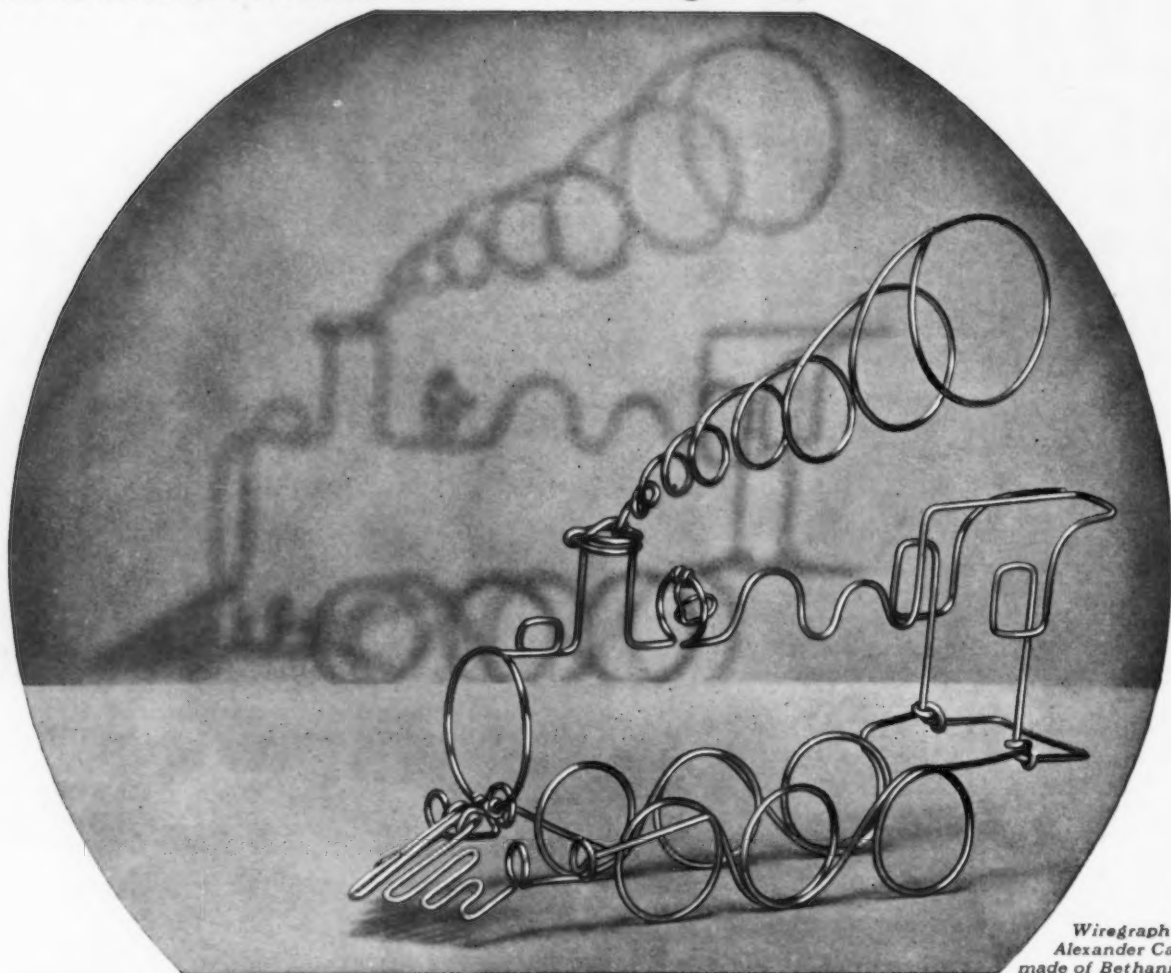
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BETHANIZED WIRE



*Wiregraph by
Alexander Calder,
made of Bethanized Wire*

for Railway Right-of-Way Fences

THE zinc coating on Bethanized Wire can be adjusted to the requirements of corrosive conditions. For railway right-of-way fences it can either be supplied with the standard weight of coating that is used for this severely-exposed application, or it can be provided with a coating two, three or more times heavier, thus increasing proportionately the life of the fence.

So different is Bethanized from ordinary galvanized wire that it enforces a reappraisal of the uses to which zinc-coated wire is adapted. The coating is applied electrolytically. It is far more tightly bonded to the steel than ordinary galvanizing. It is tougher and more ductile. It is smoother and more evenly distributed and, due to its exceptional purity, it has a silvery lustre.

Bethanized Wire can in many cases be substituted for more costly materials. Often its use results in a more attractive, longer-lasting and more readily salable product. It can be used for strand, for springs, for spokes of bicycles and baby carriages. It can be woven into chain-link fence with a coating two, three or more times heavier than standard hot-dip galvanizing without cracking or scaling the zinc, making galvanizing-after-weaving unnecessary.

Bethanized Woven Fence, Bethanized Barbed Wire and Bethanized Smooth Wire in rolls for a variety of purposes are now being manufactured by Bethlehem Steel Company. Bethlehem metallurgists will be glad to answer questions about Bethanized Wire, and to discuss its application to specific problems.



BETHLEHEM STEEL COMPANY

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▲▲▲ THE IRON AGE ▲▲▲

ESTABLISHED 1885

JUNE 20, 1935

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How Much Will You Spend To Save the Constitution?

THE engineers of the Bausch & Lomb Optical Co., who measure to millionths of an inch by means of light waves, tell us an interesting fact about the sensitivity of steel. They state that the weight of a common housefly lighting on the end of a half inch iron bar projecting a foot from a vise is sufficient to deflect the bar one millionth of an inch.

Business is a great deal more sensitive than steel. The impact of a mere rumor from Washington is sufficient to send Mr. Average Businessman high "up in the air" and to deflect millions of dollars from investment expenditure to financial "dug outs."

The economic tinkers and social experimenters whose pastime was so rudely interrupted by the Supreme Court will undoubtedly capitalize upon this situation by increasing the output of rumors and threats. In fact, the increased production is already apparent. The union labor propaganda factory is already flooding the newspapers with fictitious reports of wage and hour chiseling; there is the threat of a national coal strike unless the Guffey bill is passed and from high quarters comes the disturbing hint that the Constitution is getting old fashioned.

All of which is calculated, of course, to give business men the "Willies" and thus to cause the necessary downturn in business that will give the tinkers a new lease upon life through a public mandate.

The shoe is now upon the other foot. Whereas prior to the demise of NRA, an upturn would have justified the experimenters, now it would defeat them. This gives business an opportunity it has not had for two years or more, namely to abandon the uncomfortable position it has played as backstop and to pitch a few fast balls itself.

Business now has a unique opportunity to make social experimenting and bureaucratic "kibitzing" unpopular for a long time to come and to take from the public mind all desire for junking the Constitution in whole or in part. The way to do this is to place orders, now, for the capital equipment that you want, need and know that you must have, sooner or later. That little difference between sooner or later will not cost much but it will put the experimenters permanently to rout and save the Constitution.

Business has thought that it could not outtalk \$4,800,000,000 in the court of public opinion. Eighteen and a half billion dollars, which is the present industrial need for reequipment, will outtalk four and eight-tenths billions any time and anywhere. And our bankers should be willing to play their part in this worthy cause with the more than thirty-six billions in idle credit now available.

How much will you spend, **now**, to save the Constitution?

J. H. Van Deventer

Grinding Facilitates Production of

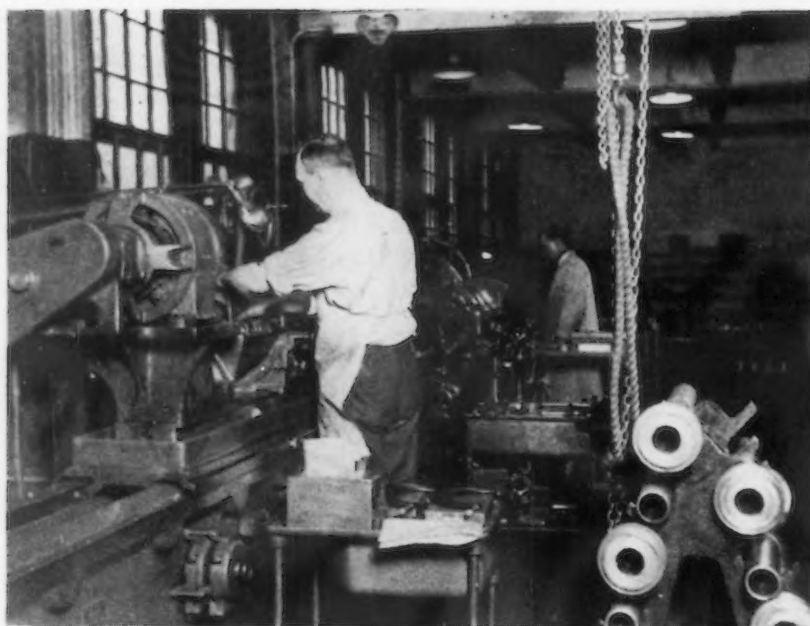


FIG. 1—Alloy steel, turret lathe spindles are accurately sized and finished on plain grinders. Convenient work racks are provided, and the lighting system of the entire department is arranged to facilitate accurate work.

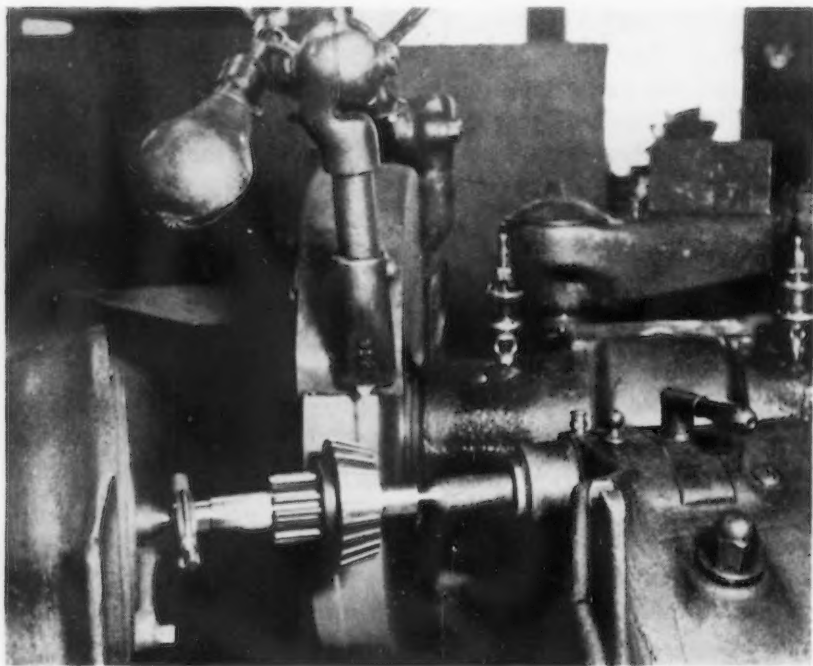


FIG. 2—In grinding a taper seat on this heat-treated friction clutch part, no variation from standard size is permissible. In common with the other machines, the grinders for this work are provided fixtures for local lighting.

By FRED B. JACOBS

o o o



CLOSE tolerances in any machining operation are impossible without accurate machine tools. American built machine tools enjoy a high reputation for accuracy, but this was not brought about recently, as processes of refinement have been developed gradually over the past 75 years or more. With the general introduction of precision grinding some 40 years ago, machine tool makers began to take advantage of this precision method. The development has been gradual, to be sure, but today grinding is employed in machine tool plants for operations that were unheard of in the early days of grinding. This article illustrates and describes a few precision operations performed at the plant of the Warner & Swasey Co., Cleveland, builder of turret lathes and telescopes.

Because machine tools cannot be made under intensive production methods in lots of several thousand at a time, the straight-line production plan is not practicable. Thus the departmental system must be followed. Such a plan offers many advantages, the chief of which is that manufacturing operations of a given kind can be performed directly under the supervision of a department foreman long trained in that particular class of work,

o o o

Accurate Machine Tool Parts

as in the grinding department in question.

In considering a few practical everyday grinding operations, turret lathe spindles offer an excellent example, as they can be accurately sized and finished by grinding much cheaper than by other methods. Referring to Fig. 1, the operation consists of finishing alloy steel turret lathe spindles on which the following sizes are ground: $5\frac{1}{2}$ in. diameter x $\frac{7}{8}$ in. long; $6\frac{3}{4}$ in. diameter x $2\frac{7}{16}$ in. long, this portion being for the spindle nose thread; $4\frac{1}{2}$ in. diameter x $3\frac{11}{16}$ in. long; $3\frac{3}{4}$ in. diameter x $9\frac{15}{16}$ in. long; $3\frac{3}{8}$ in. diameter x $9\frac{7}{8}$ in. long; $3\frac{3}{8}$ in. diameter x $11\frac{15}{16}$ in. long.

The machine used for this operation is a Landis plain grinder capable of accommodating work 14 in. in diameter and 72 in. in length. It is fitted with an alundum wheel, 36 in. in diameter, 3-in. face, 1924 grit, J grade. This wheel is operated at an approximate surface speed of 5500 ft. per min. The work speed is about 30 ft. per min., but it often is varied to suit the cutting action of the wheel.

When mounted for grinding, the work is held on special centers inserted in each end, as the spindle is hollow. Once mounted for grinding, all surfaces that must be concentric are finished at one setting, thus assuring the necessary accuracy. The tolerances on the majority of the finished diameters are very close, 0.0002-in. plus or minus. The work is sized with micrometers which are inspected periodically to make sure that they are accurate. Also, standard size gages are furnished for many operations; by means of these the operator can transfer the desired size to the fin-



FIG. 3—Heat-treated parts are straightened before grinding. The part is held between centers and rotated, and the run-out determined by bringing a dial indicator against it. The high spots are marked and then subjected to screw pressure.

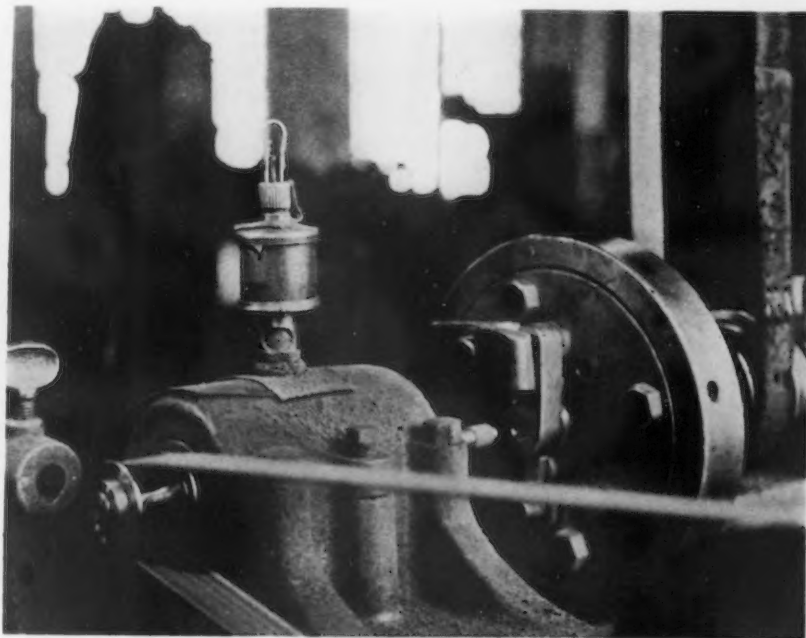


FIG. 4—Internal grinding of a hardened steel roll jaw. The spindle carries a $\frac{1}{2}$ x $\frac{1}{2}$ -in. wheel and operates at 16,800 r.p.m.

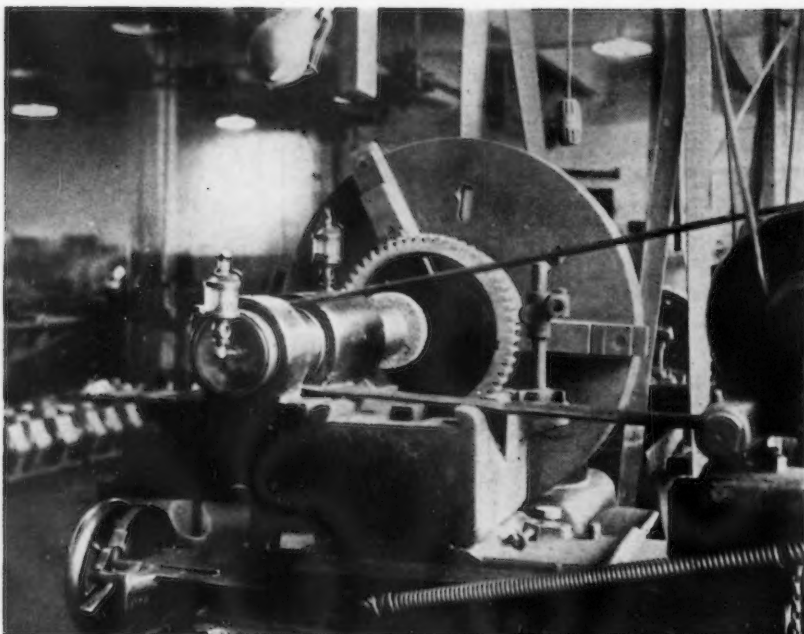


FIG. 5—Finishing a 9¼-in. diameter, 5-in. long bore in a heat-treated sleeve gear. The machine is also employed for grinding bushings, as well as for other gears of other types and sizes. o o o

ished piece regardless of whether his micrometer is off slightly.

Fig. 1 also shows the type of work rack for accommodating the spindles. It consists of two cast-iron ends tied together, the entire assembly being provided with casters for ready transportation. The locating brackets for holding the work are faced with soft brass to avoid scratching and otherwise marring the work. The chain hoist

and trolley at the right are for handling heavy work as this machine is used for a number of other precision operations on heavy work.

An excellent idea of the lighting system can be had from Fig. 1. At both sides of the grinding department are large windows which are washed at frequent intervals so that full advantage can be taken of daylight. Electric lights, arranged as shown, give ample light

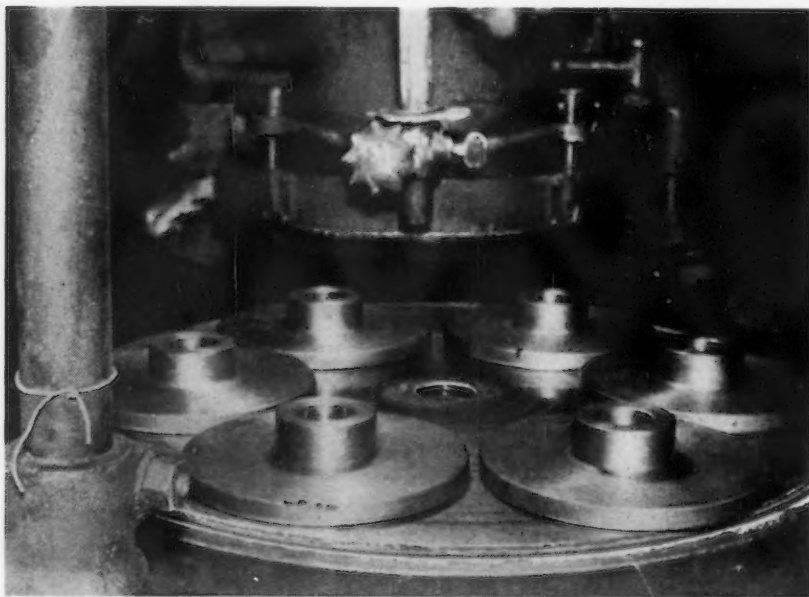


FIG. 6—Gear blanks are surface ground on this machine, six blanks 5½ in. in diameter being finished at one setting. The magnetic chuck is 25-in. diameter. o o o

on dark days and during the winter mornings and evenings. These lights are of a design that gives maximum illumination without objectionable glare. Adequate lighting is essential in any grinding department for without it eye-strain results and this gives rise to inaccurate work.

No Size Variation on Clutch Taper Seat

In many grinding operations at the Warner & Swasey plant no variation from a given standard size is permitted. This is true of the operation illustrated in Fig. 2 which consists of grinding a 60-deg. included taper seat on a machine steel, heat-treated friction clutch part. The piece is 4½ in. in diameter at the large end and the ground seat is 1¼ in. long.

The machine employed is a Landis 14 x 72-in. grinder, fitted with an alundum wheel, 24 in. in diameter, 2-in. face, 1924 grit, M grade. This wheel is operated at a surface speed of approximately 5600 ft. per min., while the work speed is about 40 ft. per min. As the illustration shows, the work is mounted on an arbor between centers in the usual way, the platen being set over 30 deg. A slight variation in the diameter is of slight consequence, but the 60-deg. angle must be exact. Otherwise the clutch would not bear fully in its seat.

In this operation the work is smeared with Prussian blue and tested in an accurate female gage. If it bears evenly all along its length this signifies that the platen has been set over to the correct angle. If a slight variation is shown, however, the machine must be reset by a cut-and-try operation until the desired results are attained. Once the machine is set it can be relied upon to grind any number of parts to the required accurate angle, provided, of course, that the wheel is cutting properly and generating a true cone. Fig. 2 also shows the type of individual light with which most of the machines are equipped. It is fitted with a shade to prevent glare, and is adjustable, so that the light can be directed just where the operator desires.

Parts Straightened Before Grinding

In finishing heat-treated parts by grinding, a straightening operation should precede the grinding. Otherwise the part might run out

to an extent that would prevent correct finishing. A straightening operation is shown in Fig. 3. The operator places the part between centers and notes its run-out by means of a dial indicator brought against the part as the part is rotated. The high spot is marked with chalk and the part set on the V-blocks shown in the illustration and subjected to screw pressure. An experienced operator can tell just about how much pressure to exert regardless of the diameter or length. Two or three tests generally suffice to bring the part within 0.001-in. of running true, which is close enough for work to be ground afterward.

High-Speed Internal Grinding

A high-speed internal grinding operation is shown in Fig. 4. This part is a hardened steel roll jaw, the ground hole being $\frac{1}{2}$ in. in diameter, plus or minus nothing. The part is $\frac{3}{4}$ in. wide. As the illustration shows, the work is held on a faceplate fixture by means of one clamp. Back of the clamp in the illustration is a $\frac{5}{16}$ -in. hole which slips over a locating pin provided for the purpose.

This machine is a Rivett high-speed internal grinder fitted with an alundum wheel, $\frac{1}{2}$ in. diameter, $\frac{1}{2}$ in. wide, 3860 grit, J grade. The wheel spindle operates at a speed of 16,800 r.p.m.

The internal grinding operation shown in Fig. 5 consists of finishing the bore in a heat-treated machine-steel sleeve gear. This unit has a bore $9\frac{1}{4}$ in. in diameter and 5 in. in depth. As the illustration shows, the work is located in a large three-jaw chuck on the workhead spindle. This machine is a Heald internal grinder fitted with an alundum wheel, 6 in. in diameter, $1\frac{1}{2}$ -in. face, 1946 grit, J grade, operated at a surface speed of 5000 ft. per min. The work speed approximates 30 ft. per min. This machine also is used for grinding other gears of various diameters, large bushings, etc.

Variety of Flat Parts Ground

Blanchard surface grinders are used for finishing a variety of flat parts, one of which is shown in Fig. 6. The parts in place on the chuck are gear blanks $5\frac{1}{2}$ in. in diameter, 2 in. in width, and as the illustration shows, the chuck accommodates six blanks at one setting. The chuck is 25 in. in diameter. In some cases the work

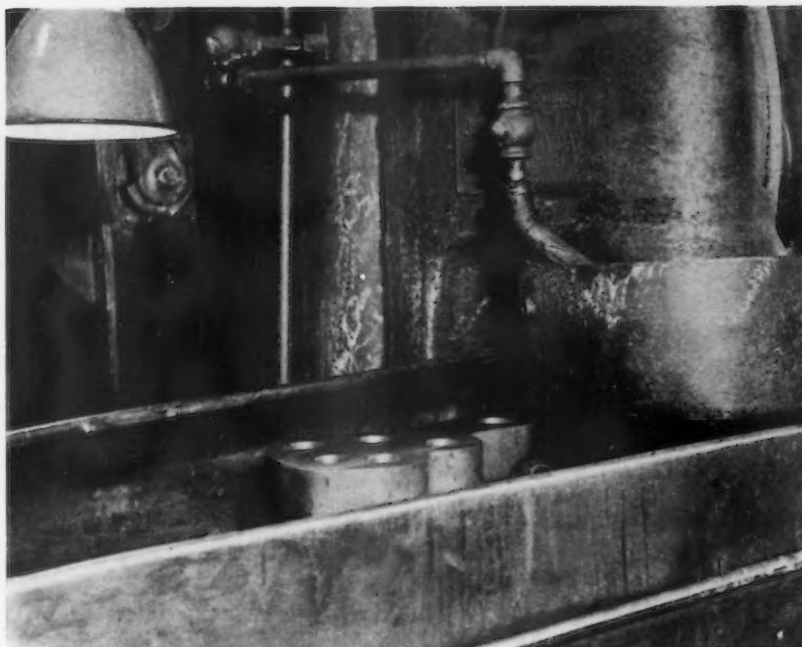
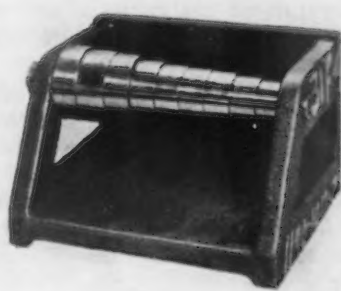


FIG. 7—For finishing the outer surface on a cast iron turning head, a surface grinder of this type is employed. The work, 13 in. long and 7-in. wide, is held in a special fixture on the magnetic chuck.

must be held within a retaining ring to prevent the wheel action from forcing the pieces out of place. In the present instance, however, the locating surface is sufficient to afford enough magnetic attraction to hold the parts securely. The wheel used is alundum, 18 in. in diameter, 24 grit, H grade, operated at a speed of 5000 ft. per min. at the rim. The

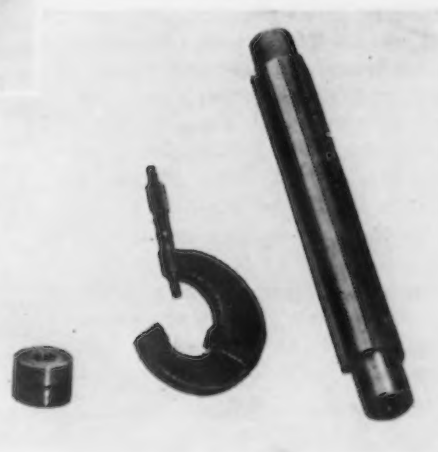
chuck speed is about 20 r.p.m., but this speed often is reduced. Parts finished in this manner have parallel surfaces, which is the condition desired. This machine is also used for finishing a diversity of other parts, in fact, for any surface-grinding operation within its limits.

In Fig. 7 is shown a Pratt & (CONTINUED ON PAGE 102)



BELOW

FIG. 8—The body sections of the spline shaft at the right are finished on a machine equipped with a cam grinding attachment. A three-point special micrometer is employed for measuring the three-section surface finished by grinding.



ABOVE

FIG. 9—Sets of gauges mounted in a cast iron holder as here shown, to facilitate setting of micrometers where work must be held to exact dimensions.

Is Pennsylvania's Leadership in Blast



PENNSYLVANIA began to produce pig iron in 1720, and soon led all the Colonies in tonnage of charcoal iron made and in the number of blast furnaces built. This leadership continued throughout the second century of the charcoal iron era in this country. In the last year of exclusively charcoal pig iron, the year 1839, Pennsylvania made nearly 80 per cent of all the pig iron produced in the United States (see Chart I). During the past two centuries more iron blast furnaces have been built within the State of Pennsylvania than in any other four States combined in the past three centuries. Out of a total of 1857 (possibly more) blast furnaces built in this country since its settlement, 683 of them were built in Pennsylvania (THE IRON AGE, Nov. 29, 1934, page 27). In all 67 counties except 14 one or more blast furnaces have been built at one time or another since 1720.

Pennsylvania took the lead in the introduction and use of mineral fuels at the beginning of the mineral fuel era in 1840 and held it throughout the entire anthracite period, and throughout the entire beehive coke period. When by-product coke was introduced in the Nineties, Pennsylvania continued to hold her prestige as a big iron producer. Now something else has happened. Today that leadership is challenged, and for two years—1932 and 1933—Pennsylvania has been eclipsed by the State of Ohio; the preliminary figures for 1934 indicate that Pennsylvania is slightly in the lead again.

To those of us who have taken an active part in this tremendous production of iron within the borders of a single State there comes the question as to whether this passing of leadership is permanent

Paper presented at second annual metallurgical conference of Pennsylvania State College, May 3, 1935.

or whether Pennsylvania can regain and hold first place as a producer of iron.

In seeking the answer to this question we must first look for, and find, the underlying sources of that leadership throughout a continuous period of 200 years.

Sources of Leadership

The double foundation of the iron and steel industry is made up of units of iron in the iron ores, and units of carbon in the fuels, either natural or manufactured. Pennsylvania has produced within her own borders an abundance of all five of the fuels used in the iron blast furnace, to wit:—charcoal, anthracite, raw coal ("block coal"—bituminous), beehive coke and by-product coke; no other State, no other country, has been so richly endowed with this half of the requisite double foundation of the iron and steel industry.

The forests of Pennsylvania furnished plenty of wood for the charcoal furnaces that were built in every part of the State, with the exception of the northern tier of counties and the extreme northeast and southwest counties where there was no ore suitable for smelting. The production of charcoal pig iron in Pennsylvania continued until 1921. Eagle Furnace, a typical cold blast charcoal furnace, at Curtin, Center County, was the last to make charcoal iron.

But it, is in the mineral fuels that Pennsylvania surpasses all other States in kinds and in tonnage. The coking coals of the Pittsburgh seam form the basis for the blast furnace fuels, not only of Pennsylvania but of her greatest rival, the State of Ohio; at present Ohio does not produce suitable coal for by-product coke, and depends almost entirely on Pennsylvania, West Virginia and Kentucky for her blast furnace fuels.

The other half of the founda-

PENNSYLVANIA has led in number and output of blast furnaces almost since the inception of iron ore smelting in this country. The history of the changes in blast furnace practice in the United States was, for many years, mainly a chronicle of developments in the Keystone State. Latterly the picture has been changing and in two of the last three years pig iron production in Ohio exceeded that of Pennsylvania, despite the latter's much larger capacity.

The author traces the

tion, iron ore, has also been mined in large quantities within the State, and during the charcoal iron period practically all of the iron ore smelted in Pennsylvania was mined there; but by far the greatest part of the ore smelted within the State for the past 40 years has come from the Lake Superior region. This drifting of the sources of iron ore from mines within the State to those outside the State of Pennsylvania is shown in Table I and Chart I.

Men of Vision

It requires something else besides natural resources of iron ores and fuels to build up a great iron and steel industry. It requires men of vision. Pennsylvania has always had such men.

In his book entitled, "A Concise History of the Iron Manufacture of the American Colonies up to the Revolution and of Pennsylvania until the Present Time," 1876, John B. Pearse said, "Much of our progress is due to the Society for the Promotion of Internal Improve-

Furnaces Threatened?

By RALPH H. SWEETSER

Consultant in Blast Furnace Practice,
New York

changes in blast furnace practice that came about with the adoption of different fuels and notes the marked reduction effected in the amount of raw material charged per ton of pig iron produced. With the Lake ores now used declining in iron content, furnace men are again faced with the necessity of using larger quantities of materials. One potential source of economy, however, has not yet been fully explored and that is reducing the nitrogen content of the air blast.

ment in the Commonwealth of Pennsylvania," and then he gives the names of nine men as representatives of the society who promulgated "the policy of internal improvement, beginning in 1826, to maintain the character and standing of the State, and to preserve her strength and resources, and which bore immediate fruit in the growth of the iron trade between 1830 and 1842."

One of the results of the efforts of this society was the act of March 29, 1836, whereby the legislature of the Commonwealth of Pennsylvania authorized a geological and mineralogical survey of the State. The first annual report of State Geologist Rogers was made to the legislature on Dec. 22 of that year. Furthermore, the legislature in that same year of 1836 passed an act authorizing the Governor to grant charters to corporations for making iron with coke or mineral fuel on exceedingly favorable terms.

Besides the men of vision it was necessary to have men of technical

skill and scientific devotion, men who were willing to risk everything, even their lives, for the sake of carrying through their visions and experiments. Among those devoted men was Dr. Friederich W. Geissenhainer, a Lutheran minister of New York City, to whom was issued on Dec. 19, 1833, one of the very first, if not the first, patents relating to the use of anthracite coal in smelting iron ores.

The date is so early that there is not even a number to his patent and it is not in printed form, but it is on file in the United States Patent Office at Washington written out in long hand. "Letters Patent, and making part of the same," contain a description in the words of F. W. Geissenhainer himself of his improvement in the manufacture of iron and steel by the application of anthracite coal. Dr. Geissenhainer claimed to "have invented or discovered a new and useful improvement in the manufacture of iron and steel by the application of anthracite coal in smelting iron ore into pigs or cast iron." In his statement to the patent office Dr. Geissenhainer claimed that he had made his discovery and had drawn up an account signed and witnessed on the thirty-first day of August, 1831, and that it was filed in the patent office on Sept. 5, 1831. According to James M. Swank in his book "Iron in All Ages," Dr. Geissenhainer successfully operated his little furnace on Silver Creek, Schuylkill County, Pa., about 10 miles northeast of Pottsville, in August and September, 1836, using anthracite coal for fuel. A breakdown of the machinery, sickness and then the death of Dr. Geissenhainer in May, 1838, prevented further operations.

The executors of Dr. Geissenhainer sold his patent to George Crane of London, England, who, according to an advertisement in a

Philadelphia newspaper, charged a royalty of 25c. a ton for rights to use anthracite as blast furnace fuel. To this same George Crane, "a subject of the king of Great Britain," was issued United States Letters Patent, No. 1024, dated Nov. 29, 1838, in which he claimed as his invention, "the application of anthracite or stone coal and culm combined with the using of hot air blast in the smelting and manufacture of iron from iron-stone, mine, or ore, as above described." The application for the patent was filed March 29, 1837.

In this letters patent issued to George Crane is a good definition of coke. He said that "according to the ordinary practice of obtaining iron from iron-stone, mine, or ore in this country, the iron-stone, mine, or ore (either calcined or in the raw state according to its respective qualities) is put into suitable furnaces with coke produced from bituminous coal—formerly called 'pit-coal,' in contradistinction to charcoal produced from wood, which was the fuel employed in this country previous to the introduction of pit-coal in the smelting and manufacture of iron." Mr. Crane further said that he did not claim the using of a hot air blast separately, nor did he claim the application of anthracite coal or stone-coal in the manufacture or smelting of iron when uncombined with the using of hot air blast.

Another name that "should be held in the front rank of honor as one of the pioneers of that industry which has made Pennsylvania in a special manner famous," is that of William Lyman of Boston, who is thus spoken of by J. P. Lesley in his book entitled, "Historical Sketch of Geological Explorations in Pennsylvania and Other States" (Harrisburg, 1876). Mr. Lesley says "the year 1839 was remarkable for Pennsylvania geology by

the experiments of Mr. William Lyman of Boston at Pottsville in smelting iron ores with anthracite coal; and also by the arrival of Mr. David Thomas and his family from Wales to attempt the same feat near Allentown. . . . Mr. Lyman, after many months of anxiety, at first alone, and afterward with the assistance of Mr. Thomas, was successful; but his exposure and labors by day and by night undermined his constitution and he died a few years afterward in New England."

"The Iron Year"

According to James M. Swank, all pig iron produced in this country previous to 1840 was made with charcoal as the blast furnace fuel. The happenings in Pennsylvania in the decade previous to 1840 have been briefly mentioned because of the great importance of the combination of beginnings. That stirring period was remarkable for the many enterprises which were started, especially in the State of Pennsylvania. The discovery of the uses of anthracite, the introduction of railroad transportation and all of the other favorable influences are very clearly described by John Birkinbine in his report on the "Manufacture of Pig Iron in Pennsylvania," published in 1895. He says in this paper "the manufacture of pig iron will be divided into three general eras, designated as the charcoal era prior to 1840, the era of development, 1840-1876, and the technical era, 1876 to present."

He further says that "the introduction of railroad transportation, the use of hot blast stoves to heat the air driven into a blast furnace and the application of steam for the motive power for the blowing apparatus, were nearly contemporaneous with the employment of mineral coal for smelting iron ores; consequently the changes in blast furnace construction and operation between 1720 and 1840 were comparatively few, consisting mainly in enlarging moderately the stack dimensions, strengthening structures, substituting barrows for hand baskets and boxes, increasing the capacity of blowing machinery and augmenting the output of metal per furnace."

The production of pig iron in Pennsylvania at the end of this exclusively charcoal iron period amounted to 190,000 gross tons of pig iron out of a total of 239,000

tons for the whole United States, or 80 per cent. Pig iron records of that period were not so carefully kept as they are now, but the records show that in the year 1841 there were 12 anthracite blast furnaces operating in Pennsylvania with a total output of 150,000 tons compared with 179,000 tons of charcoal pig iron made by 218 furnaces. Some anthracite pig iron had been produced during 1840 and by the end of that year the records show that 10 anthracite furnaces had been built in Pennsylvania, including the Crane Iron Co.'s furnace at Catasauqua, which was blown in by David Thomas on July 4, 1840.

Increase in Bulk of Raw Materials

One of the immediate consequences in going from charcoal to mineral fuels in that remarkable decade beginning with the year 1840 was a great increase in tonnage and bulk of the raw materials required to produce a ton of pig iron. According to Dr. Walter R. Johnson's book, "Notes on the Use of Anthracite in the Manufacture of Iron," published in 1841, it required the following quantities to produce a ton of anthracite pig iron at the furnace of the Crane Iron Co.:

Iron ore	=	2.08 tons
Anthracite	=	1.38 tons
Limestone	=	1.04 tons
<hr/>		
Total materials	=	4.50 tons
Air	=	34.00 tons
<hr/>		
Grand total	=	38.50 tons

The anthracite was from the Lehigh Coal Co. near Mauch Chunk. Of course it did not require 34 tons of air to burn 1.38 tons of anthracite, but that is what was blown.

At the Columbia furnace at Danville they used Shamokin anthracite, and a low grade iron ore. The record shows the following quantities per ton of pig iron:

Iron ore	=	2.96 tons
Anthracite	=	2.58 tons
Limestone	=	2.03 tons
<hr/>		
Total materials	=	7.57 tons
Air	=	20.40 tons
<hr/>		
Grand total	=	27.97 tons

Fifteen years later when David Thomas operated his own blast furnaces at Hokendauqua the average quantities used per ton of pig iron (A.I.M.E. vol. IV, page

223—Prof. John A. Church), were as follows:

Iron ore	=	2.55 tons
Anthracite	=	2.43 tons
Limestone	=	1.60 tons

Total materials = 6.58 tons

The quantity of air is not recorded, but it must have been a very large amount.

In 1875 the same Thomas Iron Co. furnaces were using less raw materials, but at higher prices, especially for the ore.

Iron ore	=	1.94 tons
Anthracite	=	1.75 tons
Limestone	=	1.15 tons

Total materials = 4.84 tons

Although it is evident from the records that considerable low-grade ore was used in the charcoal blast furnaces, yet it is also apparent that the requirements for limestone were very much less, and the fuel per ton of pig iron was less with charcoal than with anthracite.

The technique of anthracite practice was so violently opposite that of charcoal iron practice that it was a remarkable achievement that took place in that ten-year period. Those of us who have actually experienced charcoal iron and anthracite iron practice will readily see the force of that word, "violently"; no wonder the machinery broke down when the blast pressure was more than doubled and trebled in passing from the gentlest and most easily combustible of all blast furnace fuels to the densest and the least known. Moreover, the anthracite was used in great lumps in accordance with the false theory of keeping the furnace "open" by the use of big "man-size" lumps of ore, fuel, and limestone.

Anthracite pig iron practice never did reach much economy in reduction of useless bulk of materials per ton of pig iron. The anthracite blast furnace had passed out of the picture before the general practice of low ash coke was known, and before the advantages of sizing the coke were discovered. The last of the anthracite furnaces were in the Lehigh Valley, where the furnacemen were sure that dolomite limestone was the best flux, and they continued to use excess bulk for their slag, thus increasing the bulk of fuel and blast, and consequently demanding still more flux.

The gradual decrease in bulk of raw materials and volume of blast

will be further discussed later on in this paper, and we will now turn to the other natural blast furnace fuel, raw coal, sometimes called "block coal."

Raw Coal Blast Furnaces

It is interesting to note that the first use of Lake Superior iron ore in a Pennsylvania blast furnace was in a furnace at Sharpsville, Mercer County, owned by David and John Park Agnew, in 1853, using 100 per cent of raw bituminous coal for the fuel.*

coal furnace in the Hocking Valley was erected, a span of only 43 years. The building of new anthracite furnaces began in 1838 and ended in 1886, a span of 48 years, compared with a span of 267 years from the erection of the first charcoal blast furnace in this country in 1645 (about) up to 1912, when the last one was built.

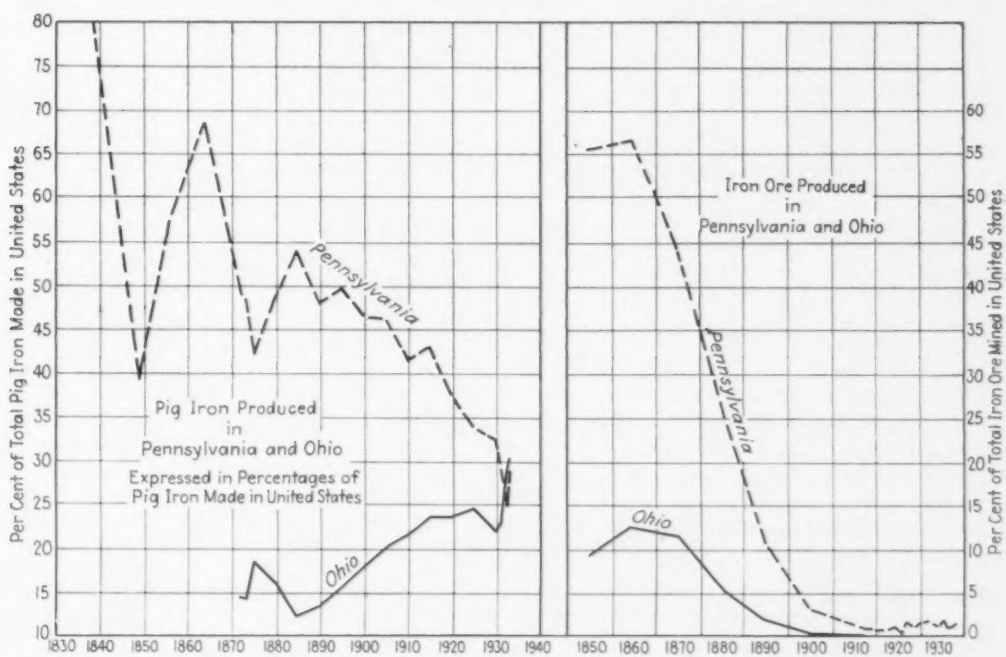
Coke Furnaces in Pennsylvania

The use of anthracite advanced much more rapidly than the use of coke. In 1849 there were 57 an-

says that in 1835 William Firmstone, a native of England, succeeded in making good forge iron for one month at the end of a blast at the Mary Ann charcoal furnace in Huntington County, using coke made from Broad Top coal. The pig was taken to a forge three miles distant and made into blooms.

It is recorded that F. H. Oliphant made a quantity of coke pig iron at Fairchance, Fayette County, in 1837. There were four coke blast furnaces built by the Great Western Iron Works at Brady's

THE relative position of Pennsylvania and Ohio as producers of iron ore and pig iron.



The use of raw coal as blast furnace fuel depends upon such a peculiar kind of bituminous coal that there were only a few places in the whole country where there were any chances of success. Mercer County in Pennsylvania had such a coal but the "buhrstone" iron ores of that region were of such low grade that the industry did not prosper. At least nine raw coal blast furnaces were built in Mercer County between 1845 and 1850, but several of them were abandoned within 10 years, and beehive coke became the almost universal blast furnace fuel of that region, together with iron ores from the Lake Superior region.

In Ohio it was different, and raw coal blast furnaces were built from 1845 up to 1888 when the last raw

thrachite blast furnaces in Pennsylvania and only 11 coke furnaces, out of a total of 298 blast furnaces in the State.

Almost exactly 100 years ago at Farrandsville, in Clinton County, extensive experiments were carried on in a vain attempt to smelt iron ores with coke. James M. Swank says in his report in Part II of the tenth United States Census—1880—" \$500,000 was sunk by a Boston company in the disastrous attempt to smelt the neighboring iron ores with coke. The company began mining coal in 1833 and the furnace was blown in in the summer of 1837, and was run till probably 1839. About 3500 tons of pig iron was made, but at such cost, owing to the impurity of the coal and the distance of the ore, further efforts to make iron with coke were abandoned."

In the same census report Swank

Bend, beginning in 1840; but the coke blast furnaces were slow in developing. As late as 1854, after 77 anthracite blast furnaces had been built, there were only 22 coke furnaces in the whole country. In his book, "The Manufacture of Iron" (Philadelphia, 1854), Frederick Overman said, "But few blast furnaces work coke in this country * * * as there is but little prospect of an addition to the number of coke furnaces which now exist, we shall devote but a limited space to this subject."

"The beginning of the manufacture of Connellsville coke dates commercially from the winter of 1841 and 1842 when two beehive coke ovens were built on the farm of John Taylor on the Youghiogheny River a few miles below Connellsville. The product of these ovens was shipped to Cincinnati in 1842 and sold with much

*Progressive Pennsylvania—A Record of the Remarkable Industrial Development of the Keystone State—Jas. M. Swank, 1908.

difficulty." (Progressive Pennsylvania—Swank—1908.)

In spite of the rapid advance of mineral fuel blast furnaces, the building of charcoal blast furnaces continued at even a greater rate than before, and the tonnage of charcoal pig iron increased for 50 years, and the peak year for charcoal pig iron production was not reached until 1890.

In that period of revolutionary activity in the iron industry of this country, especially in the 10-year period beginning with 1845, there were more blast furnaces built in the United States than in any other decade in the history of our country. To be sure, they were very small blast furnaces. The records show the following:

Blast Furnaces Built in United States in the 10 Years 1845-1854

Fuel	Stacks	
Charcoal	223	Total pig iron made, 1845—490,000 gross tons
Anthracite	73	Total pig iron made, 1854—724,833 gross tons
Raw coal	15	
Coke	23	
Total	334	

It is hard to find trustworthy statistics for pig iron production of that time, but the late John Birkinbine is authority for the statement of the active furnaces and tonnages in Pennsylvania for the years 1841 and 1856, as follows:

that is possible for the blast furnaces of Pennsylvania.

Pennsylvania Blast Furnaces

Year	Charcoal	Anthracite	Raw Coal	Coke	Total	Total U.S.
1841	218	12	0	0	230	353
1856	143	93	6	21	263	580**

Pennsylvania Pig Iron Production (Gross Tons)

Year	Charcoal	Anthracite	Raw Coal	Coke	Total	Total U.S.
1841	179,000	15,000	0	0	194,000	265,000
1856	96,154	306,972	8,417	39,953	451,496	788,515

** This total of 580 blast furnaces in the United States is recorded by J. P. Lesley, page 759, Part II, "The Iron Manufacturer's Guide to the Furnaces, Forges and Rolling Mills of the United States, with Discussion of Iron as a Chemical Element," 1859.

Transportation

In our search for the answer to the question as to whether Pennsylvania can regain her leadership in producing pig iron, we have found that the possession of iron ores and/or metallurgical coals within the borders of a State does not necessarily insure leadership as a producer of pig iron in these days of by-product coke. Something has happened to reverse these natural advantages, and evidently that something was in connection with transportation, because Ohio, hauling all her iron ore

and coking coals from points outside the State, has surpassed Pennsylvania for three consecutive years.

This question of transportation of the raw materials for blast furnaces is of greater importance to the railroads than is understood by the Interstate Commerce Commission or by the railroad officials themselves, or else greater attention would have been given to the possibility of moving a much larger tonnage of iron ore by rail than is now being done. Moreover, the raising of freight rates on iron ore and coke is not conducive to an all-the-year-around movement of iron ores in the large volume

high ash coke—and some of them are still doing it.

Considerable attention has been given to the elimination of as much ash in the coking coals as is possible before shipment so as to avoid paying freight on useless impurities. The same sort of beneficiation is now being applied to the Lake Superior iron ores, which have been decreasing in richness for many years.

Pennsylvania has not progressed as far as Ohio in the obtaining of low-ash coking coals, or else the coke consumption per ton of pig iron would be lower than it now is.

Conclusions

In preparing the data for this article many interesting statements and statistics relating to the pig iron production in Pennsylvania have been found. The one outstanding fact that can be a warning to the present generation of furnace men was the excessive cost of manufacture due to the use of low-grade raw materials. The furnace managers of a century ago were using two or three tons of iron ore per ton of pig iron because that kind of ore was convenient to get; they used a ton and a half of dolomite flux stone and thought it not unusual; they used two tons or more of anthracite coal per ton of pig iron and yet made a profit on their pig iron because for a while they were all using the same wasteful blast furnace practice.

In certain respects the blast furnace managers of the by-product coke era have made great steps toward economical furnace practice, especially in the beneficiation of their iron ores, coking coals and fluxes, but in one most important item they are just as thoughtless and wasteful as their predecessors of a century ago. As far as the records go, no one in this country is now beneficiating the most voluminous of all the raw materials used in making a ton of pig iron, to wit, the atmospheric air-blast. That eminent furnace man, the late James Gayley, was the only one to practically beneficiate the air-blast, and he only reduced the rather small percentage of moisture present.

We have enriched our ore burden to 68 per cent iron, and we have washed our coking coals to 90 per cent carbon in our blast furnace coke, but we are still using 21 per cent oxygen air-blast. If "history

is the mold of prophecy," then succeeding generations will wonder that the blast furnace men of 1935 used a raw material containing 79 per cent of an inert and wasteful ingredient that continuously carried heat from out the top of the furnace. For many years the metallurgists have dreamed of the time when oxygen could be separated from the atmospheric nitrogen at a cost sufficiently low to permit its use in the iron and steel industry profitably. According to an article in the May, 1935, *Mining and Metallurgy*, that time has now come. ("Low-cost Oxygen for Metallurgical Operations," by Theodore Nagel.)

Since it will be necessary for Pennsylvania to look to sources outside of the State for iron ores, it is obvious that the Lake Superior ores will cost more delivered at Pittsburgh than at any Ohio furnace; the blast furnaces of eastern Pennsylvania cannot afford to use them at all. Therefore, the ores must come from the magnetite mines of northern New Jersey and New York, or else from foreign mines; in either case the rail haul cost is less than the total freight on Lake Superior ores to the same Pennsylvania blast furnaces. Unless the railroads of Pennsylvania and of New York State see to it that the freight rates on coking coals and iron ores are conducive to the continuance of Pennsylvania's blast furnaces, then most of that voluminous iron ore, coke, stone and pig iron traffic will be irretrievably lost.

Table I shows conclusively that the leadership of Pennsylvania and Ohio in the production of pig iron has not been dependent on the tonnage of iron ore produced in the respective States; the bulk of the iron ores smelted in both States during the mineral fuel era has been transported from other States, especially the Lake Superior Region. During the charcoal iron era both States smelted local ores almost exclusively.

Table II shows that, with an annual capacity almost exactly 50 per cent more than Ohio, the blast furnaces of Pennsylvania have produced less pig iron and ferroalloys than the furnaces of Ohio for two of the past three years, and also that at no time in recent years have the Pennsylvania furnaces produced at as high a rate of their capacity as have the Ohio furnaces.

TABLE I

IRON ORE PRODUCED IN PENNSYLVANIA, OHIO AND UNITED STATES
SHOWING PERCENTAGES PRODUCED IN EACH STATE

Compiled by Ralph H. Sweetser from J. B. Pearse, James M. Swank, United States Census, United States Bureau of Mines and American Iron and Steel Institute

Year	Pennsylvania Gross Tons, Ore	Ohio Gross Tons, Ore	United States Gross Tons, Ore	Pennsylvania Per Cent of U. S.	Ohio Per Cent of U. S.
1839	506,724	.....	.....	.....	.....
1850	877,283	140,610	1,560,442	55.50	9.00
1860	1,351,000	288,977	2,396,485	56.50	12.06
1870	2,337,286	588,664	5,250,402	44.00	11.61
1880	1,951,495	488,750	7,489,464	26.00	6.51
1890	1,560,234	254,294	13,458,808	10.70	1.89
1900	877,684	61,066	27,553,161	3.18	0.22
1906	.....	17,384	47,749,728	.....	0.03
1908	.....	26,585	35,983,336	.....	0.07
1910	739,799	22,320	57,014,906	1.29	0.039
1913	489,056	.....	61,980,437	0.79	.....
1914	406,326	5,138	41,439,361	0.98	0.012
1915	363,309	3,455	55,526,490	0.65	0.006
1916	559,431	1,800	75,167,672	0.74	0.002
1917	546,700	.....	75,288,851	0.72	.....
1918	522,600	.....	69,658,278	0.75	.....
1919	627,167	.....	60,965,418	1.03	.....
1920	734,383	.....	67,604,465	1.09	.....
1921	146,649	.....	29,490,978	0.49	.....
1922	780,836	.....	47,128,527	1.66	.....
1923	992,441	.....	69,361,422	1.42	.....
1924	807,208	.....	54,267,419	1.48	.....
1925	955,955	.....	61,907,997	1.58	.....
1926	1,095,505	.....	67,623,000	1.65	.....
1927	1,170,435	.....	61,741,100	1.80	.....
1928	1,023,870	.....	62,197,088	1.64	.....
1929	1,092,013	.....	73,027,720	1.49	.....
1930	964,638	.....	58,408,664	1.62	.....
1931	368,117	.....	31,131,502	1.18	.....
1932	102,838	.....	9,846,916	1.04	.....
1933	264,366	.....	17,553,188	1.50	.....
1934	525,297	.....	24,587,617	2.13	.....

TABLE II

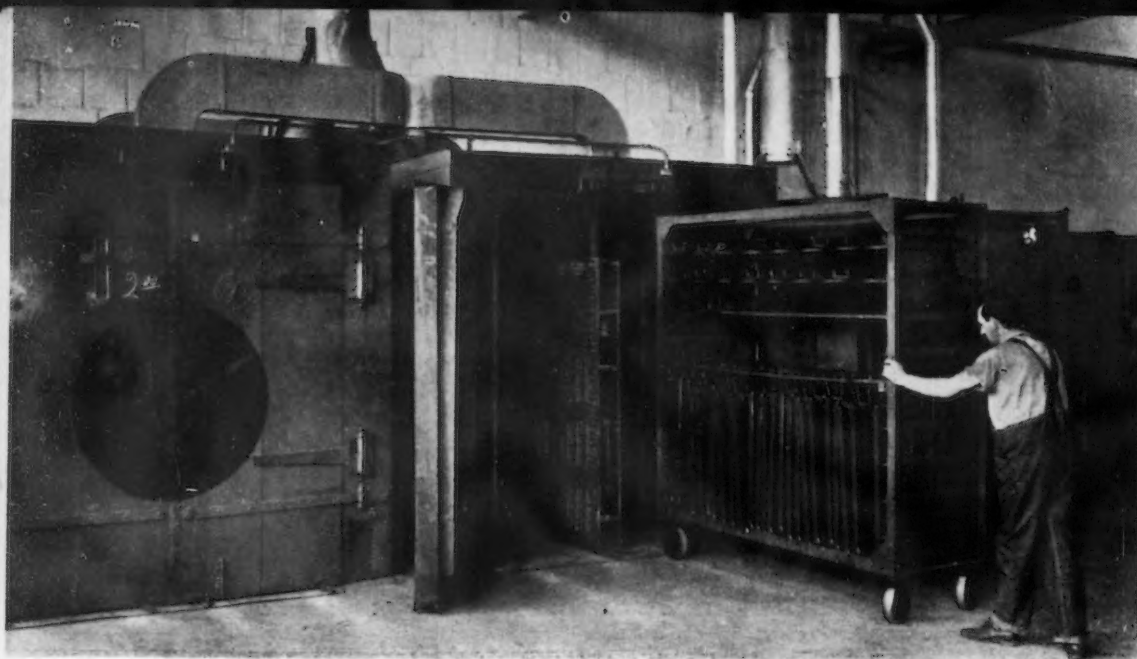
PENNSYLVANIA'S LEADERSHIP IN THE MINERAL FUEL ERA OF
BLAST FURNACES

PIG IRON PRODUCED IN GROSS TONS IN PENNSYLVANIA, OHIO AND UNITED STATES, SHOWING PERCENTAGES PRODUCED IN EACH STATE

Compiled by Ralph H. Sweetser from J. B. Pearse, J. P. Lesley, James M. Swank, United States Census, United States Bureau of Mines and American Iron and Steel Institute

Year	Pennsylvania	Ohio	United States	Pennsylvania Per Cent of U. S.	Ohio Per Cent of U. S.
1839	190,000	.....	239,000	79.50	.....
1841	194,500	.....	265,000	73.40	.....
1847	389,350	.....	800,000	48.67	.....
1849	253,370	.....	650,000	38.98	.....
1850	.....	.....	563,750	.....	.....
1856	451,496	.....	788,515	57.25	.....
1860	.....	.....	821,222	.....	.....
1864	694,991	.....	1,014,281	68.52	.....
1870	.....	.....	1,665,179	.....	.....
1872	1,251,336	356,913	2,548,713	49.11	14.22
1873	1,246,440	362,517	2,560,963	48.67	14.15
1875	857,932	371,333	2,023,733	42.39	18.34
1880	1,859,298	601,970	3,835,191	48.48	15.69
1885	2,183,478	494,647	4,044,526	54.00	12.23
1890	4,415,329	1,240,330	9,202,703	47.98	13.48
1895	4,701,163	1,463,789	9,446,308	49.76	15.49
1900	6,365,935	2,470,911	13,789,242	46.17	17.92
1905	10,579,127	4,586,110	22,992,380	46.01	19.94
1910	11,272,323	5,752,112	27,303,567	41.28	21.06
1915	12,790,668	6,912,962	29,916,213	42.75	23.11
1920	13,983,134	8,533,470	36,925,987	37.37	23.11
1925	12,523,485	8,862,646	36,700,566	33.57	24.15
1930	10,304,886	6,804,862	31,752,169	32.13	21.56
1931	5,233,224	4,189,311	18,426,354	28.05	22.95
1932	2,188,374	2,411,863	8,781,453	24.60	27.92
1933	3,892,637	3,955,261	13,345,602	28.68	30.14
*1934	4,409,342	4,292,990	16,138,573	27.32	26.60

*"Subject to revision," American Iron and Steel Institute, May 6, '35.
According to report of Committee on Special Survey of Capacity, American Iron and Steel Institute (page 20, 1931 issue of *Statistics*), the annual capacity of blast furnaces in Pennsylvania, Ohio and United States, was as follows on Dec. 31, 1931:
Pennsylvania (including 586,000 tons ferroalloys), 17,501,475 tons, 34.21 per cent.
Ohio (including 135,000 tons ferroalloys), 11,611,700 tons, 22.44 per cent.
United States (including 802,400 tons ferroalloys), 51,740,175 tons, 100.00 per cent.



PARTS are given a morocco finish, which is found to be a better coating for this kind of work and much easier to apply than the smooth, shiny enamel finish. The pieces are hung on racks and baked in the ovens shown. A temperature of 200 deg. is maintained until the paint crackles, producing the morocco-like surface, and then the temperature is increased for baking.

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Finishing Plays Important Part in Manufacture Of Office Equipment

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By F. L. PRENTISS

*Cleveland Resident Editor,
The Iron Age*

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METAL finishing plays an important part in the manufacture of office equipment by the Addressograph-Multigraph Corp., Cleveland. Following the trend toward modernistic design, mechanical equipment that comes under this classification and has become almost indispensable in office work, has been changed in contour, and plain straight lines have replaced the curves that predominated in the models of a few years ago. In

line with these changes in design, metal finishing has been given an increasing amount of attention. That attractive finishes are valuable for their sales appeal in this field as in numerous others is recognized, although office equipment is built for service rather than looks.

While there is no attempt to produce striking decorative effects on office equipment by harmonious blending of coatings and bright colors, six different metal finishes

are used by the company in the manufacture of office equipment. These are selected both for appearance and for metal protection. Parts are finished in three kinds of paint and in three plated coatings—nickel plating, oxidized finish and cadmium plating.

Machines are made by the company in about 100 models, including addressing, duplicating and typesetting machines, and a recently developed machine designated as the Multilith for offset lithograph

work. The equipment ranges in size from a hand addressing machine 4 x 6 in. in dimensions to machines occupying a floor space of 4 x 10 ft.

The main and larger members of the machines, including the frame sections, which are of cast iron, and a few stampings, are given a morocco or crackle finish. This was adopted in place of an enamel finish formerly used, because it was found more serviceable and also more economical, in that it is much easier to apply than the enamel finish. The morocco finish is tough so that it is not easily marred or scratched; moreover, the cast parts do not require a perfectly smooth surface as is necessary when a glossy smooth enamel finish is used. Consequently, little finishing work is required on the cast parts. While slight imperfections in the surface are conspicuously shown when metal is enameled without first being given a perfectly smooth surface, these rough spots are not revealed when the part has the morocco coating.

From the standpoint of economy the use of the morocco finish has resulted in a great saving, because only one coating of the finish is required compared with as many as 11 coats when the parts were finished in enamel. The use of the latter also necessitated other operations such as applying filler, sanding between coatings and also baking after each coat.

In appearance the morocco finish presents a pleasing effect and a machine so coated, in the opinion of the company's management, looks more attractive than when finished in glossy enamel. The coatings are in two standard colors, black and green. Fully 99 per cent of the surface of the machines are given

this coating, the exceptions being shafts, screws and other small parts that are plated.

The morocco coating, which is a Chinese oil base paint, is sprayed on. Equipment in the painting department includes six spray booths and three baking ovens. Two ovens are electrically heated and have

WHILE office machines are strictly utilitarian, their appearance is receiving increasing attention both on the part of manufacturers and users. The various finishes used and the methods employed to apply them in the operations of a large manufacturer are described by the author.

automatic control. The third is a gas-fired oven.

Finishing work on castings before painting is limited to grinding and filing off burrs. Stampings are cleaned before painting and the smaller ones are tumbled to take off the rough edges. Because the tough finish permits parts to be machined after painting without danger of being marred, fully 90 per cent of the work is painted before the machine operations. This results in considerable saving, for, if machining preceded spraying, it would be necessary after painting to clean the paint out of the holes and scrape it off bosses and other machine finished surfaces.

The parts, after spraying, are loaded on racks and pushed into the baking ovens. An oven temperature of 200 deg. F. is main-

tained for 45 min., the time required to crackle the paint. Then the temperature is increased to 400 deg., at which the parts are baked for 2 hr.

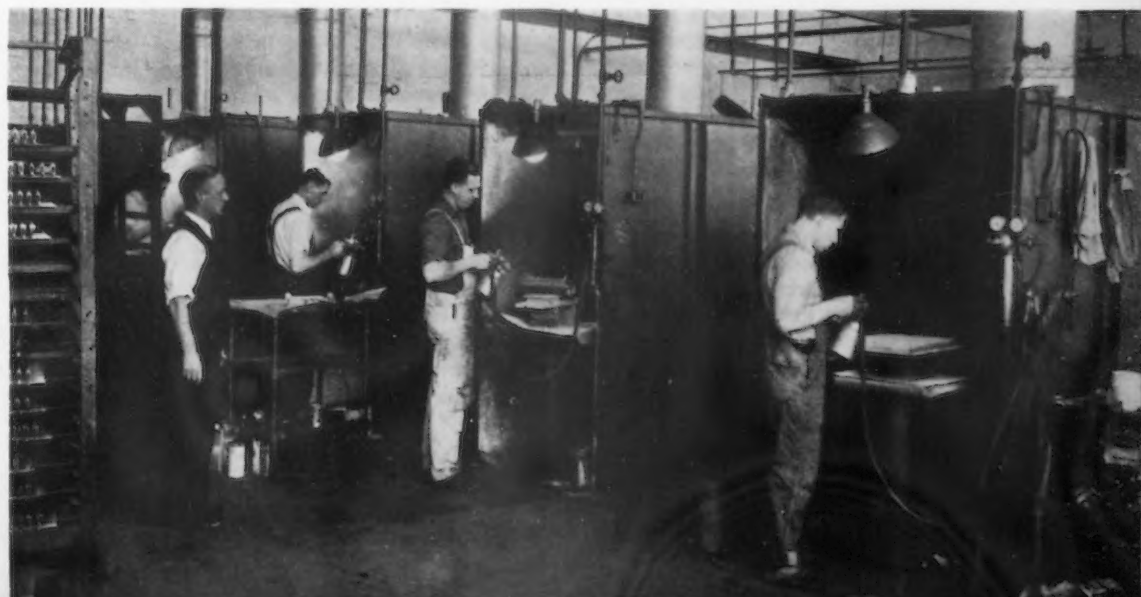
Drawers which have a smooth finish are given a dip coat of enamel and baked. Drums, which are die castings and also of cast iron, are given an outside nickel flash coating in the plating department and then go to the painting department for a spray coat of aluminum paint on the inside, both for appearance—the aluminum paint harmonizing with the nickel finish—and as a rust preventive.

Hand wheels about 5 in. in diameter made of cast iron are polished and nickel-plated all over. Then a cast iron mask is placed over the outer rim and the remainder of the wheel is sprayed with morocco paint on both sides. After baking the nickel-plated rim is buffed.

The plating department occupies a room adjoining the painting department, along one side of which is a double row of polishing and buffing machines, tumbling barrels and other finishing equipment. Polishing is done with emery abrasives on compressed 14-in. diameter patent leather polishing wheels. These have 4-in. faces except for work requiring narrower wheels. For the first polishing No. 120 grain abrasives are used and this is followed by the use of No. 180 and then No. 320 grain abrasive.

Parts to be nickel plated are cleaned in an electric cleaner and then given an acid and cyanide dip. Then a flash copper plate is deposited, 0.00075 in. thick, and the copper plating is buffed and then electrically cleaned and rinsed in water. After rinsing, the work goes to a nickel plating tank and a

SPRAY-PAINTING metal parts for office equipment in the plant of the Addressograph-Multigraph Corp. Parts that are spray-painted include tabs, which are very small pieces of sheet steel. These, made in lots up to 1,000,000, are inserted in slots in racks, each holding 1000 tabs, for spraying and baking, and these racks are loaded on a truck on which they go to the baking oven. One of these trucks, loaded with racks of tabs, is shown at the left.



0.001-in. nickel coating is deposited. Buffing follows to bring out special colors if desired. However, not much of the work is buffed.

Satin Finish Used for Parts in Direct Vision of Operator

A satin finish has replaced a bright nickel finish for some of the larger plated parts, particularly top plates that come under the direct vision of the machine operator, the satin finish being regarded as preferable because it does not produce the bright glare of the plain nickel finish. For polishing parts that are to have the satin finish the regular polishing wheels with the

any rust that the acid dip may not have taken off. Then the work is placed in a copper plating tank for 5 min., after which it is dipped in a hot cyanide solution and rinsed in cold water. The pieces are then dipped in the oxidizing solution of liquid sulphur in which they remain about one-half minute, or long enough to get the desired color. A cold water and a hot water rinse follow, after which they are dried with compressed air.

Some small parts and zinc-base die cast pulleys and also punches and dies that resemble printers' type are cadmium plated as a preventive against corrosion. Many of

for Addressograph equipment. These are little strips of thin sheet steel about $\frac{3}{4}$ in. long and $\frac{1}{4}$ in. wide with about one-half, or the tongue end, somewhat narrower than the body part. These are made in lots of 500,000 to 1,000,000 on punch presses. Some that are embossed, a separate press operation, are made of soft steel. The plain tabs, or those not requiring embossing, are made of hardened spring steel. The soft steel tabs are hardened in the hardening room and pickled and tumbled before the cleaning and plating operations.

All the tabs are tumbled 12 to 14 hr. in barrels containing 16-



VIEW of a section of the plating department. Both wood and steel tanks are used.

No. 320 abrasive for finish polishing are replaced by a Tampico brush wheel with which an emery cake of about 300 grain size is used. Cleaning follows, after which the parts are given a bright coat of copper and then a deposit of about 0.001 in. of nickel. After the nickel plating they are again put under the Tampico wheel, which gives them the satin finish.

Some Parts Given Black Oxidized Finish

Various shafts and other small parts are oxidized to give them a black finish. These are first cleaned in an electric cleaner. Consecutive operations that follow are hot water dip, acid dip to remove rust, cold water dip, and sodium cyanide dip to remove the acid and also

these small parts are hardened and then tumbled before plating. Then they are cleaned in an electric cleaner, pickled, rinsed in cold water and cleaned in a sodium cyanide dip, after which the work is dipped in a bright cadmium solution, some of it being given a flash coating and some a heavy coat. As punches and dies must be held to close dimensional limits, they are given only a flash coating of 0.0002 in. Only a 4-volt current is used for these plates and the work is left in the tank only $\frac{1}{2}$ min.

Finishing Tabs

One of the interesting production jobs in the plant because of small size of the parts is the manufacture of tabs used with selecting frames in separating mailing lists

grain emery abrasive to take off the sharp edges. Then they are tumbled 2 hr. in sawdust to give them a polish, after which they are cleaned and then nickel plated in a barrel in which they are kept 2 hr.

After nickel plating, the tabs go to the painting department where they are spray painted in any one of 14 colors. For spraying they are set in pressed steel racks about 15 in. square, having rows of slots in which the narrow end that is not painted is inserted. Each rack holds 1000 tabs. The tabs, after spraying the wide ends, are baked in the racks in which they are sprayed.

The Plating Room Equipment

The plating room equipment includes four nickel plating tanks,

one double barrel for nickel-plating small parts, three cyanide copper solution tanks, one double tank and a plating barrel for cadmium plating and one oxidizing tank. For cleaning there are two electric cleaning tanks, two hot water tanks and several cold water tanks. The nickel and acid tanks are of wood, lead-lined. Steel tanks are used for alkaline solution.

Current for the tanks is supplied by a 2000-amp., 6 and 12-volt generator and for the plating barrel by a 1000-amp., 6-volt generator. For plating small lots of small parts there is a small portable auxiliary plating barrel having a capacity of 2 qt., to which is attached a $\frac{1}{8}$ -hp. motor which revolves the barrel very slowly. This barrel may be hung on the negative rod of any plating tank.

The hot cleaning and cyanide copper tanks are steam heated, and fumes from these are carried away by an exhaust system.

Different methods are provided for handling work in and out of the cleaning and plating tanks, depending on the sizes of the pieces. Medium-sized parts are handled in and out of the tanks in baskets and larger pieces are suspended on racks.

Handling Small Parts

Screws and some other small parts are either plated in tanks or in plating barrels. Some of the very small parts that would be plated in barrels were there not the danger of their becoming marred in tumbling are loaded for



SPECIAL racks, which are quickly loaded and unloaded, are provided for handling in and out of the plating tanks those very small parts that might become marred in tumbling in plating barrels. Punches and dies are strung on wires for plating, as shown at the extreme right.

plating in tanks on special racks 18 in. wide, with four cross bars to which loops are attached. A loading rod is pushed through these loops, and, as it is moved along, a part is strung on the rod so that when fully loaded there is a part suspended between each two adjoining loops. In unloading the rack a girl at one of the three wiring benches pulls the loading rod from the rack with one hand, al-

lowing the pieces to drop into her other hand. This provides a rapid method of handling very small parts in and out of the plating baths. Some work is suspended on racks that are similar except that they have hooks on the cross rods.

The punches and dies not having holes to permit them to be suspended on these special fixtures are strung on wires for immersion in the plating tanks.

Steel Metal Accident Rate Summarized

ACCIDENT rates in the sheet metal and miscellaneous metal products industries were not altogether favorable during 1934, according to figures just released by the National Safety Council. In the sheet metal industry, there was no change in the 1934 frequency rate as compared with that of 1933, but the severity rate declined 6 per cent. In the miscellaneous metal products industries, there was an increase of 4 per cent in the 1934 frequency rate and an increase of 28 per cent in the severity rate.

The results in both of these industries may be compared with increases of 5 per cent in each rate registered by industry as a whole.

The sheet metal industry averaged 14.07 in frequency in 1934 and 1.30 in severity. Corresponding rates for the miscellaneous metals products industries were respectively 15.02 and 1.41. For industry as a whole, the frequency rate for 1934 was 15.29, and the severity, 1.70.

Accident rates in the sheet metal industry are based on reports from 184 sheet metal plants whose employees worked 124,949,000 man-hours; those for the miscellaneous metal products industries, on re-

ports from 160 plants whose employees worked 112,725,000 man-hours. The Council determines the injury frequency rate by the number of disabling injuries per one-million man-hours of exposure, and the injury severity rate by the number of days lost as the result of disabling injuries per 1000 man-hours of exposure in each manufacturing plant.

In the Council's list of 30 major industries, the sheet metal industry ranks fourteenth on the basis of frequency rate and sixteenth in severity, while the miscellaneous metal products industries rank seventeenth in frequency and fourteenth in severity.

Electroplaters Review Technical Phases of the Industry

Addresses Include:

Air Conditioning of Lacquer and Plating Rooms,

Electrodeposition of Tin,

Adhesion of Electrodeposits,

Adventures in Copper Plating from Ammoniacal Solutions,

X-Ray Methods of Diffraction Analysis.

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MEETING in Bridgeport, "the industrial capital of Connecticut," over 450 of the 1500 members of the American Electro-Platers' Society were entertained by a varied program of social, recreational and educational events during the five-day period ended June 14. One outstanding feature of this twenty-third annual convention was the exhibition of electroplating equipment and supplies at the Mosque Temple located about a mile from the Hotel Stratfield, where many of the technical papers were read.

One of the many excellent papers offered to this closely-knit guild of experienced and responsible platers concerned itself with the air conditioning of lacquer and plating rooms. This subject was reviewed in detail by A. Wilson Knecht, a consulting engineer of Yonkers, N. Y. It was pointed out that air conditioning is not new and that many industries now accept it as an important adjunct to their manufacturing facilities. It was all to the end of showing that air conditioning might benefit the plating industry that Mr. Knecht presented his discussion.

Air conditioning was first defined broadly as the science of producing and maintaining specified atmospheric conditions in a given place. Thus it is necessary to be able to produce necessary heat, cold, humidity and purification in a given space.

No attempt was made to evaluate air conditioning systems in terms of increased profits or other advantages, but the discussion was limited to the costs and advantages of various types of systems. Mr. Knecht first mentioned one major problem of the lacquer industry, namely, the "blushing" or "whitening" of a lacquer film immediately after its application. It is moisture on the surface of the partly dried lacquer film which has the tendency to throw the solids out of solution, producing the whitish or cloudy appearance. A draft of cold air striking the work while it is drying also increases blushing.

Therefore from the foregoing it is evident that the role of air conditioning in such a lacquer room would be that of keeping the work from being cooled below the dew point temperature of the surrounding air, and also to control drafts

so that they do not strike the drying lacquer. Such an elimination of blushing would do away with seasonal variations in work and permit the turning out of a uniform product despite humid, muggy or borderline days. Mr. Knecht pointed out, however, that air conditioning is not a cure-all for lacquer blushing but is a major step toward its elimination.

The second, but no less important, advantage of air conditioning is, naturally enough, the elimination of dust which is often brought into a lacquer room through the action of exhaust fans connected with spray booths and hoods.

Mr. Knecht divided his classification of air conditioning into two general types, first, as to the method of altering the quality of the air and, second, as to the means used in the distribution of the air to the space to be conditioned. Alteration of quality is, obviously, the addition or removal of sensible heat, and the addition or removal of moisture to or from the air being supplied to a conditioned space in order to maintain desired atmospheric conditions.

Heating of air is brought about by several well-known devices, and, likewise, the method of adding moisture to the air by means of water sprays is of common knowledge. The methods of removal of sensible heat and moisture are, however, comparatively new, and it was to these that Mr. Knecht devoted a considerable portion of his discussion.

Cooled by Adsorption or Refrigeration

The most common means of removing moisture or latent heat at the present time is by cooling the air to such a dew point temperature that the moisture content will be reduced by condensation to the

required quantity. This cooling can be brought about by using some refrigerant such as carbon dioxide, Freon, Carrene, or others of similar type. Also, water can be used if a source of low temperature water is available.

Moisture or latent heat can be removed from air also through a direct adsorption of the moisture by a hygroscopic material such as calcium chloride, silica gel, or activated alumina. Removal of moisture by this means, however, results in raising the temperature considerably because the latent heat released by condensation of water vapor is absorbed by the air. It is therefore necessary to after-cool the air.

The application of the hygroscopic quality of the various materials to air conditioning is a comparatively recent development, and its application has not yet had sufficient variety or years of use to state unqualifiedly that it can replace refrigeration in all cases. However, these materials have almost unlimited possibilities and are particularly suited to air conditioning in cases where air of low moisture content is required and where at the same time the dry bulb temperature is of secondary importance—for example, a lacquer room.

The second general system classified by Mr. Knecht was based on the method used in the distribution of the air. This system was divided into two classifications, unit systems and central systems. A unit system employs a number of small units located at strategic positions in the space to be conditioned. Each unit is complete in itself in that it has means of altering the quality of the air and a fan for distribution of the air. The central system, as the name implies, employs a single unit for altering the quality of the air, after which the air is distributed to various points in the space to be conditioned.

Because of the fact that the cost of installation and operation of air conditioning systems becomes greater with the increase of heat and moisture emission in a conditioned space, it is exceedingly important that such emissions be reduced to a minimum. In addition, the loads imposed by infiltration of outside air or by the exhaust of air from the space must be kept as low as possible.

The major source of refrigeration load in lacquer rooms is the enormous quantity of air that is exhausted through the hoods or spray booths. An amount of air equal to that exhausted must be cooled and dried before delivery to the room. In New York sufficient air must be exhausted through lacquer spray booths to provide an average air velocity through the frontal area of the booths of 100 ft. per min., and the exhaust cannot be reduced below the quantity thus fixed.

The sources of heat and moisture in a plating room are greater in number than in the case of the lacquer room. In the former case there are hot tanks which are double offenders in that they give off heat and moisture at the same time. In addition, there are the various motors, ovens, and the like. In order to maintain a reasonable dry bulb temperature in the room, it is often necessary to insulate the sides and bottoms of all tanks containing hot water or hot baths, and to apply additional insulation to the ovens. The installation of the motors and motor-generator sets in adjacent rooms is also of great advantage where it is possible.

In order to give an indication of the comparative costs of installation and operation of the types of systems just described, Mr. Knecht gave out cost and operation figures on the basis of an assumed lacquer room and plating room. In each case the costs were estimated for central systems using a refrigerant and using a hygroscopic material. All factors affecting the size of the equipment, and therefore the costs, were made the same for each system.

The first considered was a lacquer room having 10 six-foot spray booths in operation at one time. The room was further considered to be 75 by 20 ft. in size with the roof and one side exposed to the sun. A dry bulb temperature of 85 deg. F. was selected as optimum when considering the comfort of the workers, the rapidity of drying of the work and the operating costs of the system.

The system utilizing a hygroscopic material was based on the use of silica gel. Air drawn from out-of-doors is first filtered, then passed through the gel where moisture is adsorbed. The condensation of moisture liberates heat, and this heat is removed by

passing the air through coils cooled by the coldest water available. The air is then distributed throughout the room by means of sheet metal ductwork. The comparative first costs of the assumed systems for a lacquer room were estimated to be \$22,000 for Carrene refrigerant and \$23,000 when using silica gel. The maximum cost per hour of operation was stated to be about \$2.90 for Carrene refrigerant and \$2.15 for silica gel.

In the design of air conditioning systems for plating rooms, the room was assumed to be about 80 by 25 ft. in size with windows on two walls. The customary hot baths, ovens, motor-generators, etc., were considered to be insulated or provided with exhaust hoods, the cost of the insulation or exhaust being figured in the original cost of the entire system. The conditions selected as being the best from the point of providing the optimum conditions at the least cost were 85 deg. F. dry bulb temperature and 50 per cent relative humidity. For a refrigerant such as Carrene the original cost was figured by Mr. Knecht at \$8,000 and for silica gel the cost was \$9,000. For each hour of operation at maximum cooling and dehumidifying capacity, the Carrene refrigerant system would cost about 87 cents and for silica gel it would be about 30 cents.

Electrodeposition of Tin

In his paper on electroplating of tin, A. L. Shields of the Westinghouse Electric & Mfg. Co. made no startling statements on new theories but confined himself to production experiences encountered in the operation of a semi-automatic installation where a uniform, high quality plate is required for coils, shelves and evaporators used in electric refrigerators. The basis metal used is copper or a copper alloy, and the plated finish gives an attractive appearance and protection against the development of discoloration that would occur if the basis metal were exposed to condensation of atmospheric moisture. A tin plate is relatively low cost and it is safe to use in contact with foods.

Electroplating of evaporators and irregular shapes is preferred to hot tinning mostly for economic reasons. The latter method would be considerably more wasteful of tin and would not give a uniform appearance. Also, electroplating

insures a higher purity of tin coating than may be expected by hot dipping, where certain impurities can poison the metal.

There are today at least two types of solutions from which tin has been plated quite successfully on a commercial scale, according to Mr. Shields. These are an acid solution using stannous sulphate, sulphuric acid and other additions, and an alkaline solution using sodium stannate, sodium acetate, caustic soda and other additions. Claims for the acid process are high solution efficiency with 100 per cent anode corrosion and, therefore, low expense for solution maintenance and a low overall cost for operation. Some reports indicate low throwing power for the acid bath. The plate is a good light color with a smooth texture. The sodium stannate bath provides good throwing power, and this may be of a sufficient benefit for certain applications to offset some of its shortcomings. Probably the greatest single disadvantage is the lack of metal replenishing ability, especially when 20 to 30 per cent insoluble anode area is used.

A tank having rubber or lead lining may be used for the acid bath, while a steel tank is suitable for the alkaline solution. It seems preferable to use all soluble anodes, but if this is not practical when anodes are assembled to the cathode racks, steel, nickel or corrosion resisting steel can be used. The more insoluble anode area used the greater the expense to maintain the metal content of the bath. Cast tin anodes with hooks screwed or cast in are usually used, but if corrosion of contact between the hook and the anode occurs, the anode will coat over with black stannous tin.

Satisfactory plating can be accomplished within a wide range of the different variables. Once suitably balanced conditions are established, it is wise to maintain that balance, and the closer the better if a high rate of production is expected. Cleaning before the plating of tin is just as important as cleaning for plating any other metal.

The evaporators described by Mr. Shields are heated for strain relieving, which produces a light oxide coating. This film is readily loosened by a 5- to 10-min. immersion in a hot red dip solution

composed of 10 per cent sulphuric acid plus 1½ oz. of sodium dichromate per gallon. Thorough rinsing is followed by a 5- to 10-sec. dip in a cool bright dip acid mixture. It is essential that all traces of this acid be removed before the immersion in sodium cyanide, which is followed by a cold water rinse just before plating.

The plating solution composition in use consists of 6 to 12 oz. sodium stannate and 1.75 to 2.25 oz. of sodium hydroxide per gallon. If lower caustic is used the insoluble iron anodes will rust badly. Sodium acetate is present in amounts at least equal or probably double the caustic content although no recent test has been made. Carbonates exist in large amounts with apparently no serious effect on the plating efficiency. Hydrogen peroxide is usually added when plating is started after a shutdown. Production can be started with a new solution containing 2 oz. of sodium stannate and 2 oz. of sodium hydroxide per gallon. Tin concentration will increase and free caustic will diminish. A new solution may also be made using 24 oz. sodium stannate and ¼ oz. of sodium acetate per gallon. It is quite probable that dissolved stannate additions will regularly be required once uniform production is established. The result will be a gradual increase of free alkali which can be controlled with additions of glacial acetic acid diluted with about four parts of water. Mr. Shields stated that his company had operated at a Baume gravity of 27.5 but found it difficult to dissolve stannate in this solution, the metal content dropping below 2 oz. per gallon. When this condition develops the metal should be plated out and the solution scrapped. The solution may be chilled slowly to about 35 deg. F. and the undesirable salts removed as crystals.

The solution temperature is quite an important consideration, and at times the thickness of plate may be controlled by changing the temperature. At a temperature of 160 deg. F. it has been observed that a ratio of 12 to 14 amperes per sq. ft. for each ounce of free caustic will give good soluble anode conditions. At present the amount of anode surface or the number of anodes in solution is judged largely by their color. A yellow green is desired and a light gray might be used. A black loosely scaled sur-

face indicates too low a current density or too high a caustic content. A brown color indicates a reverse of these conditions. The color of anodes generally can be maintained a yellow green by altering the number or surface area of anodes as required, plus a control of the free caustic.

Rinsing the parts after plating requires sufficient removal of the plating solution to insure against staining along edges and in corners where the final draining takes place.

Mr. Shields summarized the plating conditions in the following manner: 6 to 12 oz. of sodium stannate per gallon, 1.75 to 2.25 oz. of sodium hydroxide per gallon, acetic acid in quantities designated by analysis, hydrogen peroxide as required for initial oxidation, a temperature of 160 to 170 deg. F., a ratio of anode to cathode area of 0.9 to 1, an anode current density of 25 to 30 amp. per sq. ft., a cathode current density of 20 to 25 amp. per sq. ft., an e.m.f. of 3.5 to 4.5 volts, a plating time of 30 to 35 min., 3000 gallons of solution, 66 sq. ft. of sheet steel insoluble anode area, about 128 sq. ft. of soluble anode area, and a capacity to plate 60 evaporators per hour.

In his paper, Mr. Shields also gave a detailed method of sampling for metallic tin and free caustic content of the solution. No tests are made for acetates or carbonates. It was also stated that a standard tin plate thickness of 0.0005 in. was usually desired. For testing for tin electroplate defective areas when plated on copper alloys, the parts are placed in an air-tight box over ammonium hydroxide. A particularly poor quality of plate will show greenish or bluish colored areas in a few minutes to a half hour, while from four to sixteen hours are required to detect points of weakness on a very durable plate. The cost of all materials involved for cleaning, plating and lacquering the evaporators averages 2.655 cents per sq. ft.

Adhesion of Electrodeposits

Information on the adhesion of electro-deposits has been presented at almost every annual convention of the Electro-Platers Society. The paper on this subject by Walter R. Meyer of the General Electric Co. was, therefore, a correlation of previous data in addition to some

original investigations made during the past year.

Adhesion is defined as the force required to effect a separation of the electrodeposit from the basis metal, either at the metal-to-metal interface or through a diffusion boundary. A trace of oxide or grease one-hundredth as thick as a thin chromium deposit will cause non-adherence of the deposit. Not that an adherent coating cannot be deposited on an oxide film, but rather that the force of adhesion will only be of high magnitude when the thickness of the oxide is less than 50 Angstrom units.

Much has been said about the possible relationship of cold-work strains to adhesion of electroplates. Mr. Meyer, however, cautioned against placing undue importance on these assumed effects and stated that his experience revealed very few cases of peeling directly traceable to cold-work strains. Grain growth, as was experienced with zinc alloys containing aluminum and tin, season cracking, or shrinkage cracks, will seldom cause peeling of the plate if it has been properly processed, but rather they will cause cracking by notch propagation. Likewise the cracking of nickel deposits cannot be ascribed to cold work strains in the basis metal for Mr. Meyer has many times produced cracked nickel plates with resultant notch propagation on annealed lead and zinc alloys, and Romanoff has also found that cracked nickel deposits cause cracks to be formed on copper basis metal.

Buckling stresses may also cause peeling or cracking. Almost all electrodeposits are produced with inherent stresses, and in the case of nickel the deposits are frequently harder than it is possible to harden cast nickel by rolling. The exact nature of the hardness has not been completely determined. In the case of chromium, it may be due to fine grain size, hydride formation, lattice distortion or co-deposition of basic or colloidal material. In general, the finer grained plates are less ductile and harder than the coarser grained deposits.

E. A. Vuilleumier has found a contraction buckling stress for nickel by investigating the change in shape of a thin foil after nickel had been deposited on one side. It was also found by C. Marie and N. Thon that a small amount of hydroxylamine added to an acid cop-

per solution changes the strain from contraction to expansion. Using similar methods, Mr. Meyer stated that he had observed strong contraction tendencies for chromium.

The differences in coefficients of expansion between the plated metal and the basis metal may also lead to cracking but seldom to flaking or peeling. A chromium plate on brass has been made to crack by alternate cooling and heating of the plated object. The application of nickel as an intermediary coating prevented this cracking because nickel has a coefficient of expansion between that of brass and chromium. In his study of brittle undercoats which form between copper and zinc, Mr. Meyer reported that 100 alternate immersions in boiling water and ice water failed to cause exfoliation of the coating whereas a very slight bend in the plate caused the alloy to fly off the plate; this indicates that the ductility relationships are far more important than the relative coefficients of expansion.

For many years diffusion between electric deposits and the basis metal has been observed for gold on lead, copper on aluminum and zinc, and cadmium on copper and iron. Many investigators have studied the diffusion velocities between copper and zinc, and there is no question that the diffusion is largely from copper into the zinc. It has been recently suggested by one experimenter that the direction of diffusion in general is from the solid with smaller interatomic distance into the solid with the larger interatomic distance. The adhesion may increase or decrease depending on the physical properties of the diffusion alloy. When the metals form a solid solution throughout the composition ranges, as with copper and nickel, perfect adhesion may result. When the diffusion alloys are more brittle than either metal, as is the case with copper and zinc, and iron and zinc, peeling may result especially if the plate is subjected to flexing. Mr. Meyer emphasized the fact that the peeling is not due to a disappearance of the diffused coating or to lowered tensile strength but primarily due to the sharp decrease in ductility.

Copper Plating from Ammoniacal Solutions

A discourse on adventures in electroplating copper from am-

moniacal solutions was given by E. A. Vuilleumier of Dickinson College at Carlisle, Pa. Whereas most platers work for dense and smooth copper deposits, Mr. Vuilleumier's interest is centered in platings which are spongy and loose.

An ammoniacal cupric solution will usually plate relatively dense, smooth and adherent copper. It was observed, however, that when the electrolyte had been in contact with metallic copper for a few hours prior to the electrolysis there was a striking change in the nature of the deposit to be obtained. It then consisted of a dull red, thick, moss-like, coarse, non-adherent mass, which showed up as bright copper crystals of fairly large size under a microscope. It was also observed that the addition of concentrated ammonia or ammonium sulphate (but not sodium sulphate), or by thorough oxidation by aeration of the partially reduced electrolyte, good results, i.e., dense, smooth, adherent deposits, were again obtainable.

Mr. Vuilleumier summarized his brief paper by stating seven observations, as follows:

(1) By electrolyzing a cupric ammonia complex, a relatively dense, smooth, adherent, i.e., good, deposit can be obtained.

(2) If metallic copper or cuprous oxide is dissolved in the ammoniacal cupric solution the deposit obtained consists of a thick, coarse, non-adherent mass of relatively large copper crystals.

(3) The addition of concentrated ammonia water, or of ammonium sulphate to this now unsatisfactory electrolyte results in a good deposit upon further electrolysis.

(4) A cuprous oxide film on the cathode is apparently responsible for the unsatisfactory deposit. Loose crystals of copper grow where the film is broken.

(5) An electrolyte from which an unsatisfactory deposit is obtained is one which does not dissolve cuprous oxide.

(6) Cuprous oxide is dissolved by concentrated ammonia, or by ammonium sulphate in the presence of a small amount of ammonia.

(7) The cuprous oxide film formed on copper added to a slightly ammoniacal cupric solution prevents the decolorization of the solution. The addition of concentrated ammonia or of ammonium

sulphate dissolves the oxide, and the solution is decolorized.

Electroplaters Use X-Rays

X-ray diffraction analysis is the study of the arrangement of the atoms in materials by means of x-rays. It supplies information concerning the atomic arrangement in the particles making up a mass, the size of these particles, their shape and the way they are arranged within the mass, the changes that take place in any one of these conditions as the result of thermal, mechanical or chemical treatment, the similarity, identity or difference of two materials, and any other characteristics directly dependent upon atomic arrangement. Since many of the more important properties of electroplated deposits depend upon just such factors and since this method is the only one competent to secure such data, it is readily apparent why the importance of x-rays to the electroplating industry can scarcely be exaggerated.

The paper on x-ray methods of diffraction analysis as applied to electroplating problems was delivered by Herbert R. Isenburger of the St. John X-ray Service, Inc., Long Island City, N. Y. Much of the paper was devoted to the rudiments of x-rays theory, and some of these observations are as follows:

X-rays are emitted whenever matter is bombarded by cathode rays. The essential parts of an x-ray apparatus are, therefore, a source of electrons proceeding from a cathode, which is a hot-wire filament in a vacuum tube; a target or anode in the path of the cathode-ray stream; and a means of applying a potential difference between the cathode and the target which will accelerate the electrons to the required velocity during passage across the intervening space. The quality of the rays can thus be controlled by the voltage across the tube and the quantity by the temperature of the filament. The quality also depends largely upon the material in which they are produced. The higher the atomic weight of the target material the greater the speed required for an electron to penetrate to the interior of an atom, hence, the higher the critical voltage necessary to excite characteristic radiation.

The critical voltages for the K-radiation of materials commonly

used as targets for diffraction analysis tubes and the wave-lengths of the most prominent lines, the "alpha" line of each, are as follows: iron at a voltage of 7500, the wave-length is 1933×10^{-8} cm.; copper at 9000 volts, the wave-length is 1537×10^{-8} cm.; molybdenum at 20,000 volts, the wave-length is 712×10^{-8} cm.; and tungsten at 58,000 volts, the wave-length is 210×10^{-8} cm. Thus, it is apparent that 30,000 volts will produce a reasonable intensity of the K-alpha radiation from molybdenum, a very great intensity from copper or iron and no K-radiation at all from tungsten.

Matter is made up of at least 32 classes of different kinds of crystals. Only three of these are of immediate importance to the electroplater, namely, the face-centered cubic crystals, body-centered cubic crystals, and hexagonal crystals. To the first group belong metals which are ductile, such as aluminum, silver, gold, lead, nickel, and the variety of irons known as the gamma type. To the second group belong alpha iron and the brittle metals, such as molybdenum, tung-

sten, chromium, and so on; and to the third group belong zinc, osmium, and some few others.

Mr. Isenburger referred to two methods of testing materials by x-rays, namely, the transmission of the rays and the surface reflection of the rays. Transmission methods are those in which the x-ray beam passes through the material to be examined, giving results which are mainly representative of the body of the material. They are particularly useful for materials that are reasonably transparent to the x-rays used. For more opaque materials, the specimen must be very thin. Surface reflection methods are those in which the x-ray beam falls upon a surface inclined at an angle more or less acute, giving results which are mainly representative of the surface layers. The surface reflection method is frequently more adaptable to electroplating problems.

To mount plated specimens for surface reflection, the sample is formed so that its surface is a portion of a small cylinder placed tangent to the x-ray beam at the axis of the quadrant diffractometer.

World Industrial Production Higher

WORLD industrial production was generally higher in April than the average in the first quarter of the year, according to the monthly statement on foreign economic conditions issued by the National Industrial Conference Board. In all the major countries except France, Belgium, Switzerland, and the Netherlands, output was considerably larger than a year ago.

Unemployment decreased from March to April according to preliminary estimates as follows: Great Britain, 5.7 per cent; Germany, 7.0 per cent; France, 6.6 per cent; and the United States, 1.3 per cent.

Reports from Great Britain indicated that industrial production in April was higher than in the preceding month. Annual statements of 242 selected British companies showed an increase in profits for 1934 of 16.5 per cent in comparison with the preceding year. During the month some improvement occurred in the Netherlands, but conditions in France, Germany,

Italy, and Switzerland were less satisfactory.

In Canada and Mexico activity increased during April as compared with March, but business conditions remained unsatisfactory in Central America. Continued improvement was reported in Argentina, Brazil, and Chile. The business outlook was more favorable in Australia as wool prices averaged 14.4 per cent higher in April than in March. Conditions in Japan were satisfactory, with rayon and steel output reaching a new record; some curtailment of both cotton and rayon textiles was reported in May.

Two new models of crawler-mounted shovels, cranes, draglines, designated as models K-40 and K-45, are presented to the trade by Link-Belt Co., Chicago. These are heavy-duty equipments and can be powered with gasoline or Diesel engines or can be electric motor driven.

To eliminate end-play and lost-motion the Ready Tool Co., Bridgeport, Conn., has developed Red-E ball bearing centers, in outside of spindles and shank types. Short overhang, grease seal and New Departure bearings are specified.

Blue Eagle Was Dead Before Court Signed Death Warrant

By G. L. LACHER

Managing Editor, The Iron Age

THE field of social experiment is definitely limited by human nature, and the world progresses fastest when the individual is given a maximum degree of freedom.

Edward Bellamy's "Looking Backward," that most enchanting description of a socialized State, fails to take human nature into account. Changes in social organization do not change human nature. Capitalism is commonly charged with breeding greed, arrogance, graft, snobbery and sycophancy. But the same evils can and do appear in other forms of society. In Soviet Russia greed for power is matched by arrogance and cruelty when power has been attained. Snobbery must inevitably crop out among the favored few who enjoy eminence or authority, while sycophancy is the natural attitude of the many that are trying to curry favor with those at the top.

But in addition to these excrescences of all forms of society, Communism and other types of authoritarian organization, such as Hitlerism and Fascism, are characterized by terrorism. Freedom of speech or of the press is unknown in such social systems. The individual is dogged in every move of his daily life by an omnipresent secret police.

And the reason for this is that restriction of private enterprise necessarily involves compulsion, and the more that private initiative

SOCIAL experimentation is costly, but, if it demonstrates the unsoundness of dangerous theories, is not in vain. Some of the lessons learned from the defunct national recovery program are outlined by the author. His remarks are abstracted from an address delivered by him at Slippery Rock, Pa., June 15, before the fifth annual Western-Pennsylvania Industrial Conference.

is curbed the more that compulsion is required.

Excessive compulsion accounts for the death of the NRA, for the Blue Eagle was dead even before the Supreme Court signed the death warrant. In its original simple objectives, namely, to establish minimum wages and to spread employment, the recovery movement was not objectionable. In fact, there was almost universal acclaim of it as a necessary emergency move. You will recall that the President's Reemployment Agreement, which was entirely voluntary, won virtually 100 per cent adoption among the employers of the nation.

But the emergency purposes of

NRA were soon lost sight of. Under the guidance of a military man, who perhaps imagined himself a second Mussolini, complicated codes were hastily drawn up and a huge administrative bureaucracy was created which attempted to control all of the countless ramifications of American business down to the last workman. Only a military man, trained in an organization in which authority passes from the top down through corps, divisions, brigades, regiments, battalions and companies to the last private in the rear rank, could believe such a set-up adaptable to society at large. He forgot that compulsion, upon which military organization depends, is tolerated during wars only because the fate of a nation is at stake. It is regarded as something that has to be borne during the period of emergency, but, in a democracy, is anathema as a regimen for times of peace.

Labor Clause Fomented Intermittent Unrest

Administrative interference with business produced its most unfortunate results in the field of industrial relations. Section 7-a of the recovery act may have been theoretically defensible in its purposes, but in practice it fomented intermittent unrest. Regarded by organized labor as a mandate to unionize all industry, it released the most determined organizing campaign in our history and pre-

(CONTINUED ON PAGE 79)



Improvements in Production

Improved No. 4 Universal Turret Lathe Features Large Cross Slide Dial

AN improved No. 4 universal turret lathe has recently been announced by the Warner & Swasey Co., Cleveland. This machine has been developed to utilize to best advantage cemented tungsten carbide, in addition to high-speed steel cutting tools. It has 12 spindle speeds which range from 30 to 751 r.p.m. and a 7½-hp. motor may be used. Provision is made for the application of a two-speed motor, giving an additional 12 speeds. Improvements include strength throughout with increased capacity—swing, 18¼ in. and bar capacity, 1¾ in.

Anti-friction bearings are used throughout the head, and the front of the spindle is mounted on double roller bearings. All head gears are of chrome-nickel alloy steel, hardened and ground. Hardened steel strips in the turret saddle are re-

placeable. A circumference binder ring automatically clamps the turret after indexing. The travel of the turret slide is 12 in., with the power feed applied through a friction clutch.

A feature of the cross-slide is a large dial so graduated that 1/16-in. movement of its rim advances the slide 0.001 in. A new automatic indexing square turret facilitates manipulation. Pressure lubrication with grease is used in both aprons. A plunger pump on the cross-slide lubricates both the slide and the bed ways.

The grease-lubricated gear box is equipped with pick-off gears, making it possible to change the entire range of feeds as provided by the alloy steel apron gears.

Ratchet-type bar feed is designed for fast operation at high spindle speeds. Bar stock is held

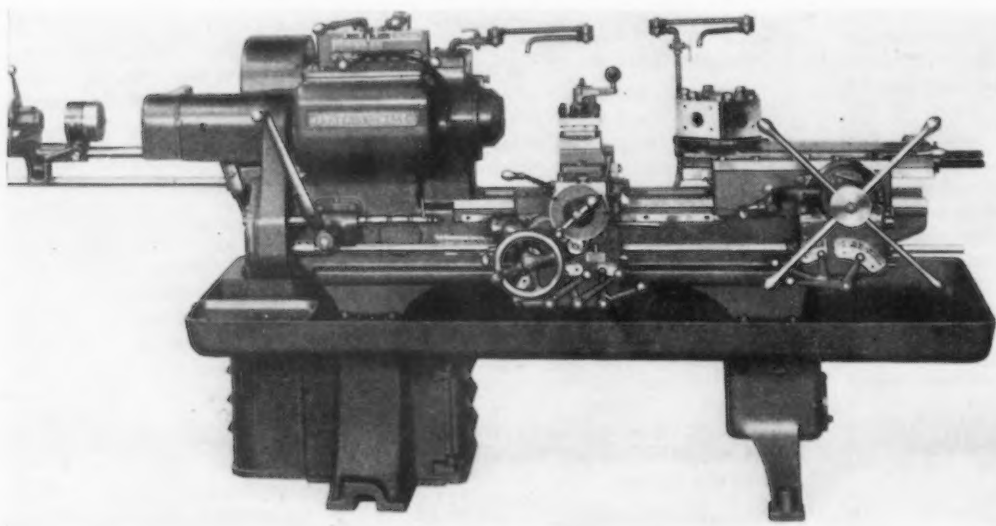
firmly concentric with the spindle bore by a revolving feed chuck mounted on anti-friction bearings. This design affords greater speed in loading and less fatigue to the operator.

All levers are centrally located.

Only natural movements are needed—head levers move horizontally and feed levers move vertically. Feed levers have fingertip control. Direct spindle-speed reading for head levers allows rapid manipulation and eliminates charts, diagrams and letter symbols in determining spindle revolutions.

Distinct improvements have been made in the taper attachment, making it usable for all cross-slide tools mounted at front and rear positions. This unit is of rigid construction and may be clamped from the operator's position.

The bed is made of high-tensile nickel iron with a very high percentage of steel. All gears throughout are of alloy steel and heat treated.



IMPROVEMENTS incorporated in this universal turret lathe are along lines providing for extended use of types of tools which permit extreme cutting speeds.



Visual Gage Utilizes Stress Forces For Dial Finger Readings

DURING the past five years there has been considerable change in shop practice as to inspection routine. This partially because of the introduction of the visual gage, which possesses certain advantages of technique in the classification of parts inspected.

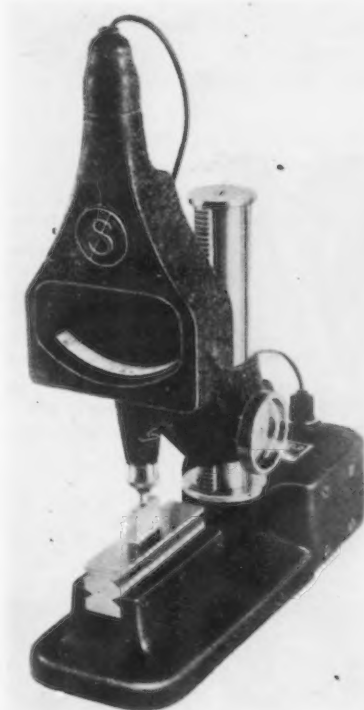
A new No. 1 visual gage, introduced by the Sheffield Gage Corp., Dayton, Ohio, serves both for rapid inspection to close accuracies and as a precision comparator by which fine shop-gages may be periodically checked.

An illuminated dial registers a relative movement of 0.000025-in. by $\frac{1}{8}$ -in. unit spaces. A difference of 0.001 in. in anvil setting moves the indicator $\frac{1}{2}$ in. along its scale. This 5000 to 1 magnification is said to result from obtaining mechanical and optical magnification without resort to movable gage elements. No element in the assembly of the gage is subject to sliding friction and, therefore, opportunity for loss of accuracy from such wear is eliminated.

A reed mechanism, consisting of four flat reeds, is so arranged that the insertion of the work to be gaged places one set of reeds in compression and the other set in tension; the movement resulting from the equalization of these stresses causes a pointer to move across the reading scale.

The upper gaging element is diamond tipped to minimize effects of wear. The lower anvil is furnished in two interchangeable types, one flat for the gaging of flat and outside cylindrical diameters, the other, of mandrel type, for gaging internal diameters. The flat anvil is made of Sheffield special steel. When used for high production inspection a strip of tung-

sten carbide is set in the flat surface of the anvil as an additional protection against wear; this strip is $\frac{1}{2}$ in. wide. The mandrel anvil, for internal diameter gaging, carries two strips of tung-



THIS visual gage employs an illuminated dial for assuring accurate reading of indicated measurements.

sten carbide. These are set solidly with their surfaces slightly above the outside circumference of the mandrel. A lower contact, consisting of a spherical tungsten carbide point, is set in the end of a lever which actuates the diamond-pointed upper gaging element. This design provides that all internal diameters are determined from a three-point contact.



THE lower anvil is furnished in interchangeable types for variety of gaging.

The gage head, carrying the reed mechanism, is readily moved up and down on a large diameter standard; the maximum range of travel is 6 in.

Gage setting is by "master" placed between the lower anvil and the gaging element. A large thumb-screw is used to bring the gaging element into approximate position; final adjustment is by moving a knurled nut on the spindle, just above the diamond-tipped gaging element.

A No. 3 visual gage differs from the No. 2 in that it operates on a 1000 to 1 magnification, while a relative movement of 0.0001 in. between the gaging elements registers a distance of $\frac{1}{8}$ in. on the illuminated dial. These gages are used on any 110-volt a.c., 60-cycle current. A transformer is mounted on the base for stepping down the voltage to 8 volts; this current is used only for dial illumination.

High-Speed Gear Cutting With New Machine and Method

SINCE 1865, the Gleason Works, Rochester, N. Y., has devoted itself to the design and manufacture of straight and spiral bevel and hypoid gear-cutting equipment. The latest machine addition involves not only a new machine but also a new method for finish cutting spiral bevel and hypoid gears; primarily for manufacturers of automotive equipment.

The machine is designated as the No. 11 single cycle gear finishing machine. The method is said to be the fastest yet devised for this work. The work piece is previously rough-cut in standard Gleason roughers and transferred to this machine for finish cutting.

The face-mill finishing cutter has two series of inserted blades. First a series of blades of progressively increasing depths which

a gap in the cutter which follows after the second series of blades. When this gap comes abreast of the blank, the latter is indexed.

The cutter rotates at a uniform speed. When the revolutions equal the number of teeth in the gear the gear is finished. Because of light finishing cuts by each blade, cutter life is extended and only slight metal removal is required in sharpening.

The advantages of the new machine and method are stated by the makers as follows:

Single revolution of the cutter to cut one tooth. . . . No lost time while indexing. . . . Rigid units. . . . Work spindle is locked during cut and automatically loosened for indexing. . . . Slow-turning cutter spindle is the only moving part in operation during cutting. . . . No

heavy cutting thrusts. . . . Cutter seating surfaces ground with spindle mounted in its own bearings. . . . Hardened and ground precision index plate, mounted directly on the work spindle.

Chuckling and dechucking operations facilitated by power chucking and stripping mechanism, built into the work-spindle and controlled by a conveniently located lever.

The operation of the control lever gives the following results in the order named: Gear clamped to arbor. Work-head advanced to cutting position. Work-head clamped.

An overhead tie connects the work-head supporting unit to the cutter column and contributes to the stiffness of the machine.

The automatic last-tooth stop eliminates any possibility of re-cutting. The stop resets itself after each gear.

Lubrication is entirely automatic. Conveniently located sight-glasses are employed.

A hydraulic unit carrying 600 lb. per sq. in. pressure supplies power for hydraulic functions and delivers sufficient power to operate more than one machine. The unit is driven by a separate 2-hp., 1200-r.p.m. motor.

The coolant pump is driven by a motor of $\frac{3}{4}$ hp., 1200 r.p.m.

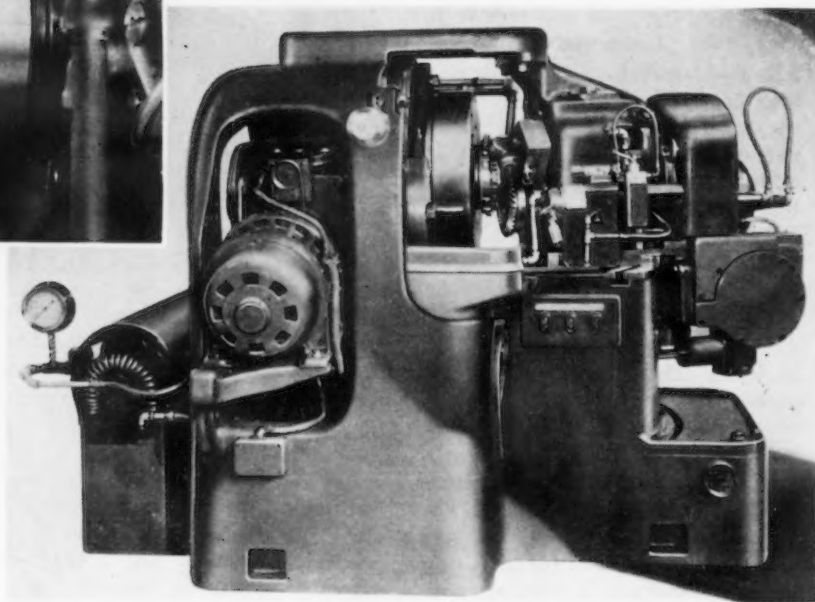
The cutter is driven by a 3-hp., 1200-r.p.m. motor, which is mounted on a support integral with the cutter spindle housing which is clamped to the main frame.



THIS new automotive production equipment involves not only a new machine but also a new method, utilized for rapid straight and spiral bevel and hypoid gear-cutting.

accurately shape and space the tooth by a succession of light cuts. Then a series of finishing blades, each cutting the full depth; these size the whole profile of the tooth and produce the smooth finish and accurate spacing.

The cutter and gear remain in normal full-depth operating position during the machine cycle. Provision is made for indexing by



Ratcheting Roll Seam Welder Eliminates Interrupting Devices

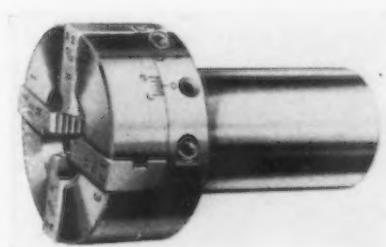
FOR welding clean mild steel $\frac{1}{4}$ to 3-in. wide, 0.006 to 0.020 in. thick and less than 18 in. in length at speeds of not more than 4 ft. per min., the Thomson-Gibb Electric Welding Co., Lynn, Mass., is offering the ratcheting roll seam welder illustrated, designated as the D12-17.

The machine does not require expensive current interrupting devices; instead it is equipped with a ratchet drive which stops the rolls during the welding period and produces an interrupting effect. The ratcheting roll welder produces seams by making a series of overlapping spots. It is equipped with long life cadmium copper alloy welding wheels with $\frac{1}{8}$ -in. faces. The welding speed can be definitely varied within a range of 2 to 4 ft. by means of a Reeves drive. A reversing mechanism on the motor drive makes it possible to feed the work either into or out of the throat of the machine. Pressure is controlled by a foot-operated treadle which can be latched down while the machine is operating. A switching device turns the current on and off automatically as the rolls are lowered and raised. Power

is supplied by a 17 kva. water-cooled transformer, and heat is controlled by a 25-point heat regulator.

New Geometric Solid Adjustable Die Head

THE solid adjustable die head, illustrated below, has been designed by the Geometric Tool



Co., New Haven, Conn., primarily for cutting short threads where the time for backing off is not important. It may also be used advantageously on chucking machines

and similar equipment where the die swinging space is limited. This DJ style die head also features simplicity of construction and low cost. Removable chasers are used. The overall length is short, the diameter is as small as is consistent with chaser support. Chasers are not only replaceable, but each set is adjustable to cut the desired class of fit; to reach the specified pitch diameter and to adjust for resharpening and wear; two adjusting screws are employed. The body design is skeletonized. Sturdy screws, seated well into the body on a broad surface provide for holding size, even under conditions of rapid reverse. These DJ heads are built in a range of sizes from $\frac{5}{16}$ in. to 6 in. maximum diameters. Special alloy steels, hardened and ground, are employed throughout.

Accessory Attachments For High-Speed Milling

BROWN & SHARPE MFG. CO., Providence, R. I., announces two additions to its line of milling attachments. Both are designed with anti-friction bearings throughout to permit of the high speeds required in modern production. The No. 12 attachment is fully universal and designed to be used for drilling, milling angular slots or surfaces, cutting racks, etc. The spindle is driven by hardened bevel gears and has a B & S taper hole. The ratio of the attachment spindle to the machine is $1\frac{1}{2}$ to 1. The attachment is suitable for speeds to 2000 r.p.m., and for use on all styles of Brown & Sharpe machines, standard and high-speed, Nos. 1, 2 and 3 sizes. Positioning can be at any angle in both vertical and horizontal planes; indicating graduations read to half degrees. The head is clamped at any desired setting. The attachment is clamped to the face of the column and is supported at the outer end by the arbor yoke. A draw-in bolt is employed for holding adapters, etc., in the spindle.

No. 12 H₂ Attachment

This attachment is of vertical type and is designed for use in the heavier classes of milling operations at high speeds. The spindle (CUTS ARE SHOWN AND TEXT CONTINUED ON PAGE 92)



ABOVE
THE die head shown above can be used where the swinging space is limited.

AT LEFT
WELDING speed is varied through a Reeves drive built into the seam-welder.

Line of Machines Adapted for

FOR machining compressor housings and similar parts, five production machines have been brought out by the Defiance Machine Works, Defiance, Ohio. The operations of this new group of machines include both vertical and horizontal rough and finish boring and facing, drilling, reaming, counterboring and tapping. Single and multiple way operations are preformed—all heads are inclosed for force feed lubrication.

The heavy duty two-spindle machine, Fig. 1, is designed for rough and finish boring and for facing the bottom of compressor housings. The column is a heavy type cored casting which supports a hydraulic feed cylinder for operating the head and also incloses weights that counterbalance the head. The fixed center head is arranged for Tex-rope drive; the spindles are driven by cone-type worm gears. Spindles run in Timken bearings. The boring bars run in hardened steel bushings.

The machine has a 3-station,

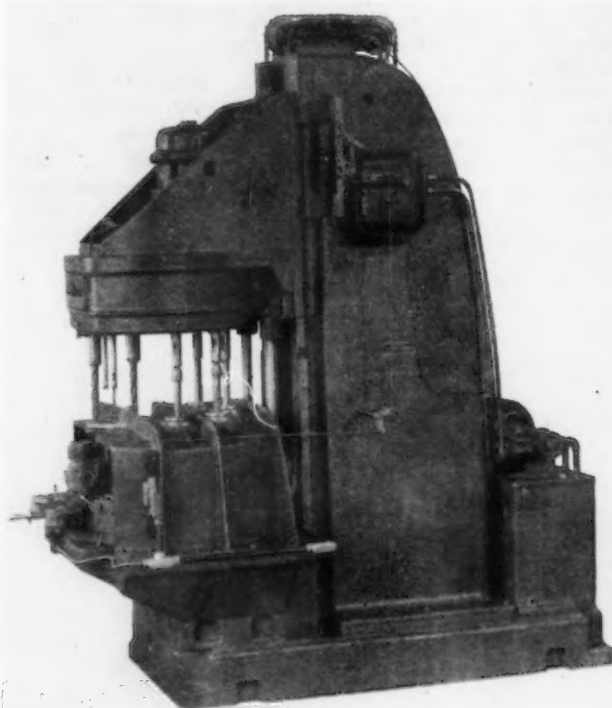
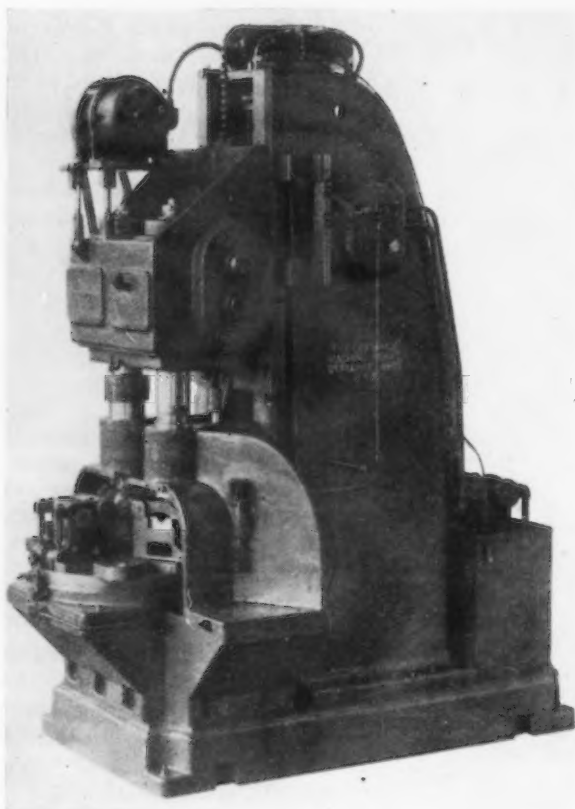
30-in. circular-head indexing table, fitted with fixtures for positioning and clamping the work at each station. Successive operations are loading, rough boring and rough facing, finish boring and finish facing. A pilot bar, attached to the head, enters a bushing on the table, and locks the table in its proper position. The fixtures are of the 2-jaw, self centering type.

The hydraulic feed cycle is: rapid advance of the cutting tools; feed through the cut; dwell for the facing operation, and rapid reverse to stop. The machine is said

to have a capacity of machining 80 castings per hour.

A vertical eight-spindle machine, Fig. 2, is designed for core drilling, rough and finish boring the cylinder bores, and drilling a $\frac{3}{8}$ -in. hole in the top of the compressor housing. The column is of type similar to Fig. 1. The head is arranged for direct motor drive. Spindles and gears are of heat treated alloy steel; Timken bearings are used. An eight-station, 36-in. circular hand-indexing table is used. This is fitted with eight fixtures for positioning and clamping the work.

THESE new vertical type production machines provide for convenient loading without cramping work positions.



DIRECT motor drive is provided for types of drill heads such as are mounted in the above set-up. Tex-rope drive is illustrated at the left.

The operations are: load, core drill, semi-finish bore and ream the cylinder bores, and drill the $\frac{3}{8}$ -in. hole. Two pilot bars attached to the head lock the table in proper position. The guide bushings for semi-finish boring and finish boring bars are mounted in anti-friction bearings and are keyed to the boring bars; guide bushing brackets are mounted on the fixture pedestal.

Hydraulic feed is regulated to suit requirements. The automatic

Compressor Housing Operations

feed cycle is rapid traverse of cutting tools to work, power feed through cut, and rapid reverse. Capacity is rated at 60 castings per hour.

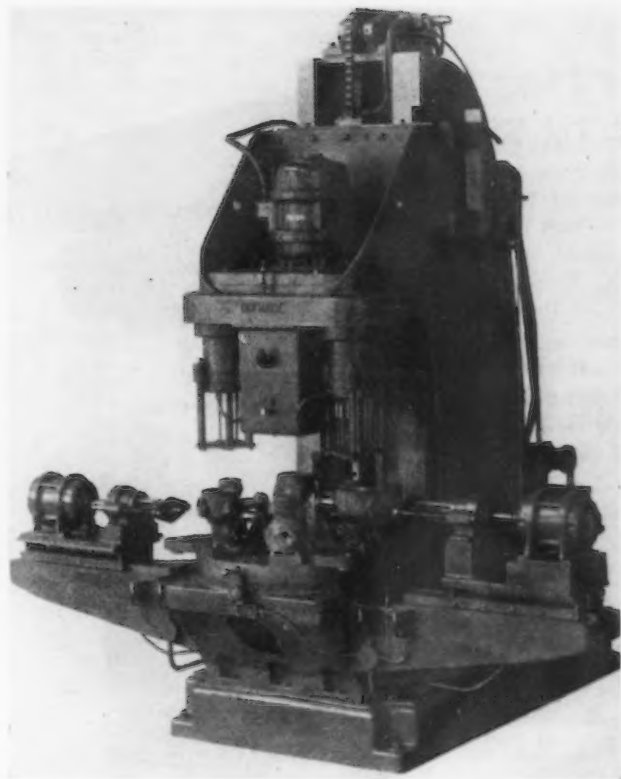
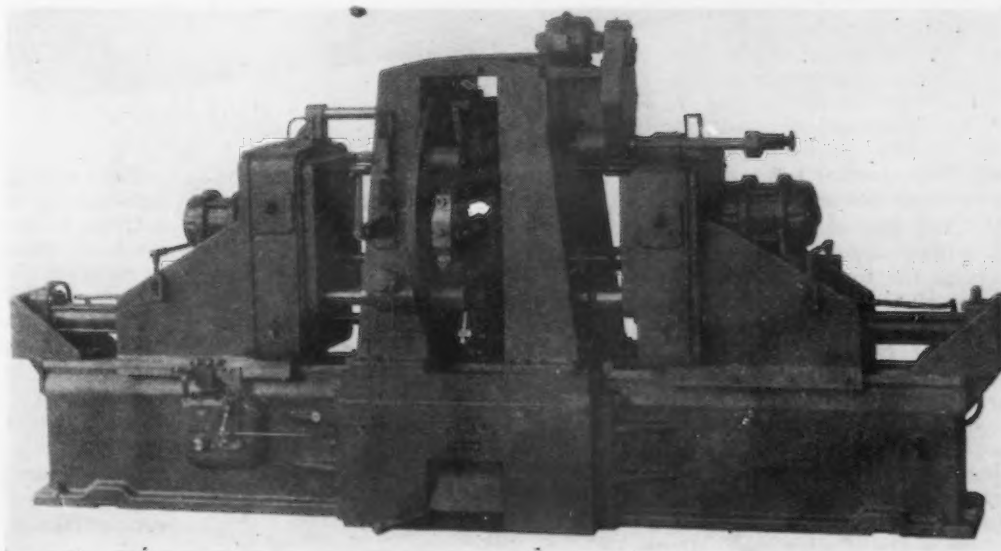
Motors for this and also for the

two-spindle vertical boring and facing machine, Fig. 1, are a $7\frac{1}{2}$ -hp., operating at 1800 r.p.m., for the driving head, and 2-hp., operating at 1200 r.p.m., for hydraulic feed.

A horizontal seven-spindle, two-

way machine, Fig. 3, is for rough, semi-finish, and finish boring; rough and finish facing; and line-reaming the crankshaft bore. The base is of cored design, with a center member to which are attached

HORIZONTAL type machines have a unit flexibility which adapts this new line of equipment to a considerable variety of work.

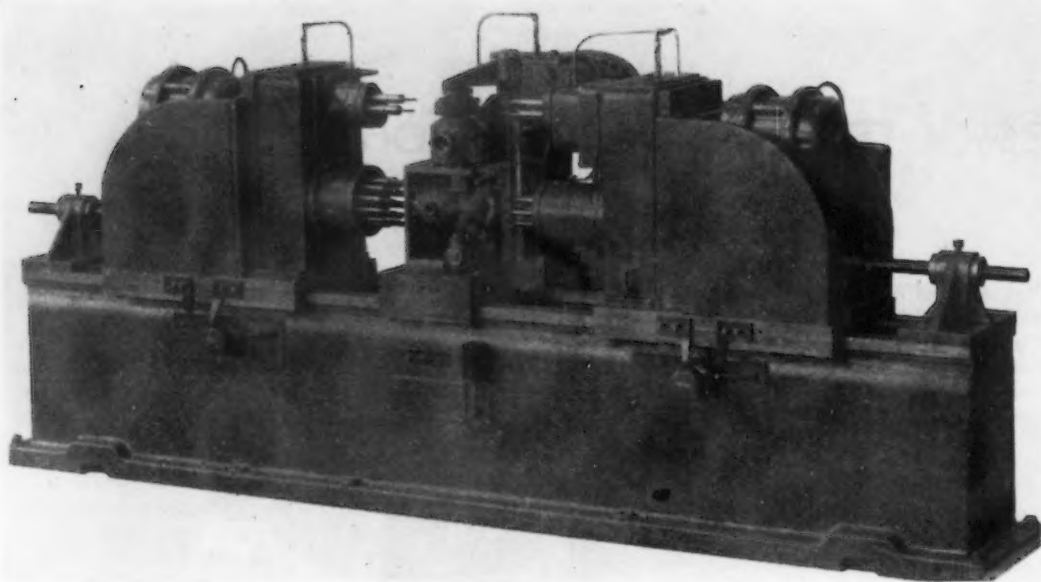


THE vertical type machine at the left is designed for the accomplishment of many operation combinations, both vertical and horizontal.

two separate members that carry the slides on which the heads and motors are mounted. Each of the two heads has three spindles mounted in Timken bearings. Heat treated alloy steel gears and spindles are used. A direct connected motor drives each head. An auxiliary head is mounted on a trunnion pedestal for line reaming.

A five-station trunnion-type fixture is provided and is Timken-mounted between heavy housings. A pilot bar attached to one head locks the trunnion in its proper position. The feed is hydraulic and each head has a cut steel rack and pinion for synchronizing. The automatic hydraulic feed cycle is rapid traverse of cutting tools to work, feed through cut, dwell for facing, and rapid reverse.

Motors recommended are a 3 and 5-hp., operating at 1800 r.p.m., for driving the left-hand and right-hand heads respectively, a $\frac{1}{2}$ -hp. motor, operating at 1725 r.p.m., for driving the reaming spindle, and a 3-hp. motor, operating at 1200 r.p.m., for driving the hydraulic



HORIZONTAL applications of drill head units to individual power ends of the horizontal type machine are well illustrated in this set-up.

feed. The machine has a rated capacity of 68 castings per hour.

A 58-spindle machine, Fig. 4, is for drilling and countersinking the holes in the top, bottom and side flange. The heavy cored column carries a cluster-drive head to which the multiple spindle heads are attached. The column supports the hydraulic feed cylinder and incloses counterweights. The horizontal fixture pedestal has two wings carrying the slides on which two side-heads are mounted. The head has direct motor drive. Spindle gears are of alloy steel. Drive shafts are mounted in Timken tapered roller bearings, and the spindles are mounted in precision type ball bearings. Four vertical heads drill 24 holes and countersink 22 holes in the top and bottom of the casting. Two side heads drill and countersink six holes in the side flange. Adjustable collets are used in the spindles when centers permit.

The equipment includes a 30-in., three-station, hand-operated indexing table with two fixtures at each station. The operations are: load, drill top, bottom and side; countersink top, bottom and side. A pilot bar attached to the vertical head locks the table in proper position.

The machine has hydraulic feed and each head is equipped with a cut steel rack and pinion for synchronizing. The automatic feed cycle is rapid traverse of drills to work, feed through cut, and rapid reverse. The rated capacity of the machine is 76 castings per hour. For driving, a 7½-hp. motor, operated at 1800 r.p.m., is recommended for the vertical head; a 1-hp. motor, at 1200 r.p.m., for the horizontal heads; and a 2-hp. motor, at 1200 r.p.m., for the hydraulic feed.

For tapping all the holes in the top, bottom and sides of a compressor housing a 33-spindle, three-way, tapping machine, Fig. 5, has been developed. The cored base consists of one front member, to which the rear member is attached, the unit so formed carrying slides on which the heads and motors are mounted. The heads are direct motor driven. Alloy steel is used for gears and spindles. Drive shafts are Timken mounted; precision type ball bearings are used in spindle mountings.

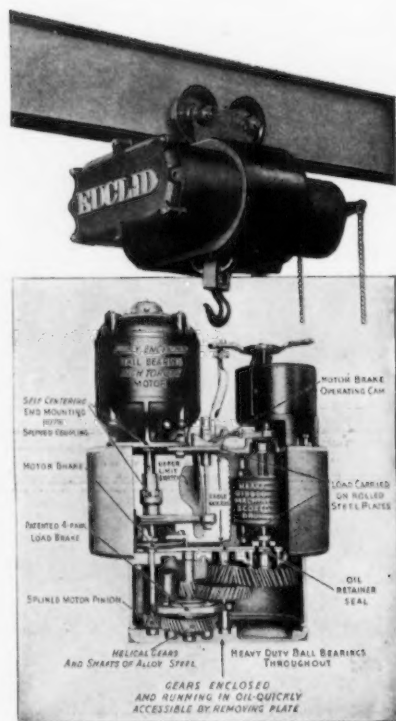
The right-hand head taps 14 5/16-in. holes, the left head 12 5/16-in. holes and the rear head six ¼-in. holes and one ⅞-in. hole. A two-deck fixture is mounted on the frame. The casting is positioned in the fixture twice for every complete tapping cycle. Screw feed, driven directly from the drive box of each head, is provided. Rated capacity is 70 castings per hour.

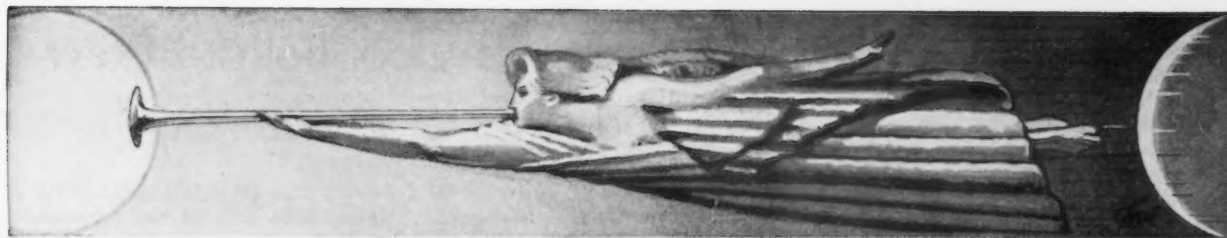
The capacity rating on each of the machines is based on an 85 per cent efficiency.

Electric Hoist Has Helical Gear Drive

THE incorporation of helical or spiral gear drive in a new electric hoist is announced by Euclid-Armington Corp., Euclid, Ohio. The hoist is shown at the right.

The main frame is of rolled steel; gears and shaft are of alloy steel, heat treated and ground. All shafts are mounted on heavy-duty ball bearings. All gears run in oil and are fully inclosed; bearings are splash lubricated. A patented load-brake of alloy steel has four pawls, opposed, two of which are always engaged. A cam-controlled disk brake for motor stoppage prevents load drifting. Control may be from remote point. The end mounted motor is coupled by self-centering, machined bell and splines.





NEWS OF THE WEEK

Gray Iron Founders Laud Voluntary Cooperation

NO cutting of wages or raising of hours beyond the schedules prescribed by the foundry code will be made by members of the Gray Iron Founders' Society, Inc., according to an announcement made after a recent meeting at Cincinnati.

"In spite of the Supreme Court's NRA decision, we are not through with codes," this assertion was made to the convention by F. R. Hoadley of Ansonia, Conn., president.

"No other nation in the world ever has been able to support so large a proportion of its population by means other than agriculture. Those countries which have the least violent fluctuation and the fewest severe depressions are those which have the largest proportion of the people nearest the soil," continued Hoadley.

"The great increase of wealth in the United States and the tremendous development of manufacturing has imposed upon manufacturers a great responsibility. As time goes on, it will be more and more necessary for manufacturers to engage in a maximum of collective activity, but with self-restraint and always in the public interest.

"Inevitably this will make necessary a system of codes or their equivalent, but let us hope that in the development of that system we may profit from the mistakes of the untried and immature experience from which we now are emerging. The first great requisite of future codes must be voluntary cooperation and even the majority within an industry should not attempt to impose a code upon an unwilling minority.

"Right at this point we find the great opportunity for the national trade association which, if well organized and given adequate backing by the members of an industry, can make a splendid contribution to stability, if it proceeds along sound lines of economy."

Centralized Representation Necessary

Hoadley declared that centralized representation was an absolute necessity and that today the isolated manufacturing unit was in a hopeless position.

"Results are obtained through mass opinion and mass influence," he said. "Only through a strong centralized organization, backed up by all the single units within an industry can we hope to obtain the greatest benefits. We hear more and more about political expedients, and more and more we are suffering from a vicious spoils system. Our industry must take its place along with other industries as a strong integrated unit which can exert its combined influence for those things which are necessary for its survival."

Hoadley said that a national association, drawing its support from several hundred members, could afford to offer valuable services to its members which most of them, as individuals, could not afford.

With the expiration of the code the question was left open for discussion as to whether the industry would disintegrate or continue as a unit. Floor discussion indicated members of the industry would continue cooperative effort through their trade associations.

The Thursday morning session

was confined to code authority reports and reports of officers of the society. Following Hoadley's address, C. B. Magrath, vice-president of the society, told of future activities of the organization. James W. Hook, New Haven, Conn., vice-president of the Durable Goods Industry Committee and member of the Industrial Advisory Board of the NRA, told of the NRA as it stands today.

Among speakers at the sessions were Olin Glenn Saxon, professor of business administration, Yale University.

The convention was attended by 110 foundrymen from Eastern and Middle-Western States.

Committee to Survey Welding Literature

ENGINEERING FOUNDATION has appointed a welding research committee to conduct a critical review of world welding literature, to render modest aid to individual projects functioning under the fundamental research committee of the American Bureau of Welding, and to sponsor specific research investigations. The project will be started by funds contributed by the Engineering Foundation supplemented by funds and services supplied by industry. It is sponsored jointly by the American Institute of Electrical Engineers and the American Welding Society.

The committee will canvass industry to determine what services can be counted upon by the committee in the formulation of a program which will most effectively utilize the total of the resources that will be available to it. These contributed services will be of various kinds: reviews of literature

and translations of foreign language articles which have been or are being made for private purposes; technical assistance, materials, and the loan of apparatus in connection with specific research investigations; unpublished research data.

It is also proposed to collect information from which can be prepared a list of research projects now under way and being planned that can be made available to the committee. Suggestions will be solicited for research projects which are recommended for prosecution under cooperative auspices. Another plan being considered is the setting up of a clearing house for translations and abstracts dealing with welding literature.

C. A. Adams, Harvard University, is chairman of the committee, and William Spraragen, American Welding Society, 33 West Thirty-ninth Street, New York, is secretary. Other members are: J. H. Critchett, Union Carbide & Carbon Research Laboratories; J. J. Crowe, Air Reduction Sales Co.; H. M. Hobart, General Electric Co.; D. S. Jacobus, Babcock & Wilcox Co.; G. F. Jenks, ordnance department, United States Army; and F. T. Llewellyn, United States Steel Corp.

High-Tensile Steels Used in Oil Trucks

HIGH-TENSILE steels, heretofore used mainly in railroad equipment, are now finding a market among manufacturers of motor trucks, and particularly oil trucks. Load limits on highways have been established by several States, with the likelihood that other States will soon follow suit. Hence the necessity of increasing the payload and decreasing the dead weight of trucks. In the case of oil trucks, Cor-ten high-tensile steel has been used to fabricate the tank and Man-ten has been used in the chassis. In each case a weight saving of 20 to 25 per cent has been achieved.

The DeVilbiss Co., Toledo, Ohio, to facilitate prompt and effective treatment of industrial burns, has brought out a special atomizer for applying tannic acid. The device features a wide-mouthed bottle to facilitate filling, stirring and cleaning. Acid and water levels are clearly marked on the bottle for assurance in mixing. A wide volume of soft spray gives quick and effective coverage.

Steel Industry Is Cool Both to New NRA and F. T. C. Agreement

WHAT appeared to be an inspired news article regarding a supposed dilemma that is facing the codeless steel industry was published in one of the New York newspapers on June 16. The purport of the article was that the steel industry faces the alternative of extending its fair practice agreements under the Federal Trade Commission act or of submitting a voluntary code to the President under the new skeletonized NRA.

Careful inquiry in the steel industry has failed to disclose any basis for the news article other than perhaps the imagination of the author. There has been no discussion among steel leaders, so far as can be ascertained, either of submitting fair practice agreements to the Federal Trade Commission or of submitting a voluntary code to the President.

The steel industry as a whole has never formulated fair trade practice agreements under the Federal Trade Commission act, and a number of smaller groups that did so, among them the bolt and nut manufacturers, became involved in difficulties because of alleged violations of the anti-trust laws. There is no evidence that the steel industry has even given a thought to seeking Trade Commission approval of trade practice standards.

As to submitting a voluntary code to the President, there has been no discussion of that step either, so far as can be learned. The steel industry has already pledged itself to do everything that could be required in a voluntary code. Whether the submission of a code embodying such voluntary pledges would be anything more than a formality is difficult to state at this date, steel leaders say. If submission of such an instrument to the President would have the effect of inviting the Administration to reintrude itself into industrial relations, which under the Schechter decision are regarded as intrastate, it is likely that sentiment in the industry would be against such a move.

In this connection it is observed that the Administration is apparently determined to pass the Wagner labor disputes bill and to set up machinery for regulating industrial relations in manufacturing regardless of the common interpretation of the Schechter decision. Obviously industry will

bring the Wagner act, if it is passed, to a court test as soon as possible, though in the meantime labor difficulties will no doubt multiply.

General Electric Makes Housing Program Gains

MARKED progress in its housing program, calling for the construction of 1300 modern homes by Sept. 1, has been announced by the General Electric Co. Under the new American home-building program, committees have been and are now being formed in communities throughout the United States, composed of General Electric dealers, public utility representatives, and builders, for the purpose of constructing one house for each hundred thousand of population. As many of the houses as possible were to have been begun about June 15, taking added impetus from the support of the Federal Housing Administration which is bending every effort to launch a nation-wide home-building movement on that date.

The New York committee, one of the first to be organized and begin operations, is planning on the erection of 50 houses in the metropolitan district. In the Chicago area another 50 homes have already been promised by the committee there, and the Pittsburgh committee has plans under way for the construction of 35. Altogether more than a hundred local committees have reported.

Work has been started by the Edward G. Budd Mfg. Co. on engineering plans for 20 two-car streamlined, stainless steel trains to be built in France for Chemin de Fer de L'Etat (State Railways of France). The trains, which will cost approximately \$1,200,000, will be constructed by the Carrel-Fouché Co., which has been licensed to use the Budd process of fabricating stainless steel and other patents employed in the building of streamlined trains in the United States. The trains will incorporate the best features of the Zephyr trains and the Flying Yankee built in the United States and will be similar to them in basic construction. They will be air-conditioned and capable of carrying 220 passengers each.

Ore Distribution in 1934 Reflected Large Gain in Chicago District

DISTRIBUTION of Lake Superior ore in 1934 when total rail and water shipments were 22,124,264 tons is shown in annual charts issued by the Lake Superior Iron Ore Association. Figures presented also give the production by ranges and shipments from upper Lake ports previously published, the consumption at receiving ports and the redistribution from these ports to other consuming points. Distribution of foreign and eastern ore is also shown. Figures given represent units of 100,000 tons.

Shipments to Lake Erie ports and Detroit last year were 163 units and to Lake Michigan and other consuming ports 56.6 units. Lake Erie ports received 153 units of which 42 units were consumed at the receiving point and the remaining 111 units were reshipped to interior furnaces.

Cleveland led with 40 units, of which 13 were consumed locally, the remainder being shipped to 9 consuming points in the Ohio, Pittsburgh and Wheeling districts. Conneaut received 33 units, all of which went to the Pittsburgh and Valley districts. Lorain received 21 units, 9 of which were consumed locally. Ashtabula received 17 units, all of which went to the Pittsburgh, Valley and Steubenville districts. Buffalo received 16 units, practically all of which was consumed locally. Erie received 9 units, all of which was shipped out, as the Erie furnace was not in blast. Toledo received 8 units, one-half of which were consumed locally, the remainder going to southern Ohio. Fairport received 7 units, all going to the Valley district and Huron four units, which were trans-shipped to four consuming points.

Units reshipped from Lake Erie ports to consuming points and districts were: Hamilton, 2 units; Jackson, 1 unit; Portsmouth, 1 unit; Iron-ton, 1 unit; Wheeling, 1 unit; Canton, 2 units; Steubenville, 16 units; Pittsburgh, 53 units; Valley, 31 units; Johnstown, 4 units; Detroit, 0.03 unit; Columbus, 0.1 unit, eastern Pennsylvania, 0.04 unit and miscellaneous, 0.017 unit.

Ore receipts at other than Lake Erie ports and consumed at receiving points were: Indiana Harbor, 13 units; Gary, 16 units; South Chicago, 22 units; Detroit 8 units; Port Colborne, 6 units; Hamilton, Ont., 4 units; and Sault Ste. Marie, 1 unit. The 51 units

received by Indiana Harbor, Gary and South Chicago compares with 44 units received at these consuming points in 1933 when total shipments were only slightly less than last year. In addition, charcoal blast furnaces in northern Michigan took 0.46 unit.

The ore supply for consumers in the eastern district including eastern Pennsylvania, Maryland, northeastern New York and New England consisted of 23.5 units, of

which 9.2 units came from New York, New Jersey and Pennsylvania mines and 14.3 units were imported. New York mines supplied 2.4 units, New Jersey mines 1.4 units and Pennsylvania mines 5.4 units.

Chile led in the shipments of foreign ore with 9.4 units as compared with 4.7 units in the previous year. Norway and Sweden furnished 1.1 units, Russia and Europe, 1 unit, Cuba 1.5 units, Africa 0.6 unit, Australia 0.5 unit and other countries, 0.2 unit. Sparrows Point led in the receipt of foreign ore with 11.4 units. New York received 2.2 units, Philadelphia 0.1 unit and other ports 0.5 unit.

Holidays and Semi-Annual Stock Taking Depress British Steel Mart

LONDON, June 18 (By Cable).—The market is affected by the Whitsun holidays and deliveries are likely to remain restricted during the semi-annual stock taking. Pig iron is dull but output equals consumption.

No transactions in semi-finished steel with the Continent are likely before August and some heavily booked English makers are accepting orders only for protracted deliveries. It is believed that the proportion of semi-finished steel to be imported under the cartel agreement will be about one-third of the total 670,000-ton quota.

Prolongation of the International Rail Makers Association and renewal of the ship plate agreement are now being discussed and

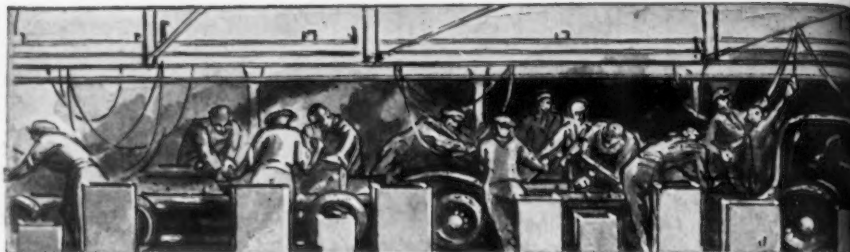
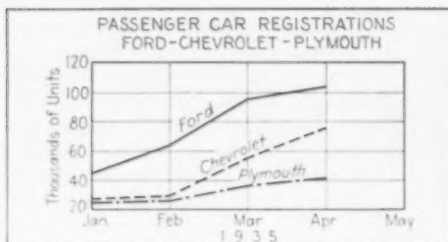
chances for the revival of the International Tube Cartel are considered brighter.

The engineering and building trades are absorbing large tonnages of structural steel. Exports are quiet.

Tin plate consumers here are covering their requirements up to the end of the year and exports are improving, particularly to South America and the Continent. Prices may soon be advanced.

Continental iron and steel markets are steadier owing to the agreement with the United Kingdom and the improved French political outlook, but business is still quiet because of the holidays and the general obstacles to international trade.

British Prices, f.o.b. United Kingdom Ports		Official Continental Prices, f.o.b. Continental Ports	
Per Gross Ton		Per Metric Ton, Gold £	
Ferromanganese, export £9		Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.	
Billets, open-hearth £5 10s.	to £5 15s.	Billets, Thomas. £2 7s.	
Tin plate, per base box..... *18s.	2d. to 19s.	Wire rods, No. 5 B.W.G. £4 10s.	
Steel bars, open-hearth £7 17½s.		Steel bars, merchant £3 5s.	
Beams, open-hearth £7 7½s.		Sheet bars..... £2 8s.	
Channels, open-hearth £7 12½s.		Plate, ¼ in. and up £4	
Angles, open-hearth £7 7½s.		Plate, 3/16 in. and 5 mm. ... £4 2s. 6d.	
Black sheets, No. 24 gage..... £9 5s.		Sheets, ¼ in. £4 7s. 6d.	
Galvanized sheets, No. 24 gage...£11 5s.		Beams, Thomas. £3 2s. 6d.	
*To July 1: 18s. 5d. to 19s. 3d. thereafter.		Angles (Basic)... £3 2s. 6d.	
		Hoops and strip base £4 2s. 6d.	
		Wire, plain, No. 8 £5 7s. 6d.	
		Wire nails..... £5 15s.	
		Wire, barbed, 4 pt. No. 10 B.W.G. £8 15s.	



THIS WEEK ON THE

Car Manufacturers Buy New Equipment As Plans for 1936 Models Take Shape

DETROIT, June 18.

Although the first half of the year is not yet over, the automobile industry is thinking in terms of the 1936 market. New model programs are rounding into shape and equipment is being purchased for what car manufacturers believe will be a better production year than 1935. That shows the extent of the optimism which pervades the Detroit area, for even the most chronic pessimist has had little if any ground for complaint this year.

No one is rash enough to venture any definite predictions about next year's volume for the industry. On the other hand, at least two prominent sales officials have burst into print lately with forecasts of five-million-car years in the near future and a larger number of executives are braving possible ridicule by voicing their conviction that the day yet will come when every family will have two cars in its garage.

The most practical gesture of confidence in the future consists of capital expenditures for plant improvements and expansion of capacity. This gesture has been made by automobile companies throughout this year. Ford has spent around \$30,000,000 to expand its facilities at the Rouge plant. Pontiac and Fisher Body are in the midst of a construction program to double their capacities at Pontiac. Olds, having acquired the former Durant plant at Lansing, is preparing to make use of a larger manufacturing area.

As one views 1936 prospects, the outstanding fact is that car manufacturers are not planning sensational innovations. Nothing so radical as the Airflow's introduction in January, 1934, or the turret top last December looms on the automotive horizon. There naturally will be some shifts in materials and improvements in designs, but that should be looked upon as a run-of-mine development. New dies are being made for front fenders and hoods, but otherwise changes will be few. One automotive executive, speaking of coming models, made the vivid remark that "they'll be the same old gals with their faces lifted."

The New York show starts Nov. 2. Prior to that event there will be plenty of maneuvering for strategic positions. Chrysler "got the jump" at the start of this year and will be seeking the same advantage in connection with 1936 models. General Motors, chafing from the amount of business lost to competitors because of production delays (especially with Chevrolet), will move heaven and earth to have adequate stocks of all cars in the field by show time. In fact, the corporation's highest officials have given their personal pledges to dealers on that point. Ford, alive to the opportunities arising from being early in the field, is not likely to be left at the post. So a merry sales war will enliven the industry in the fall.

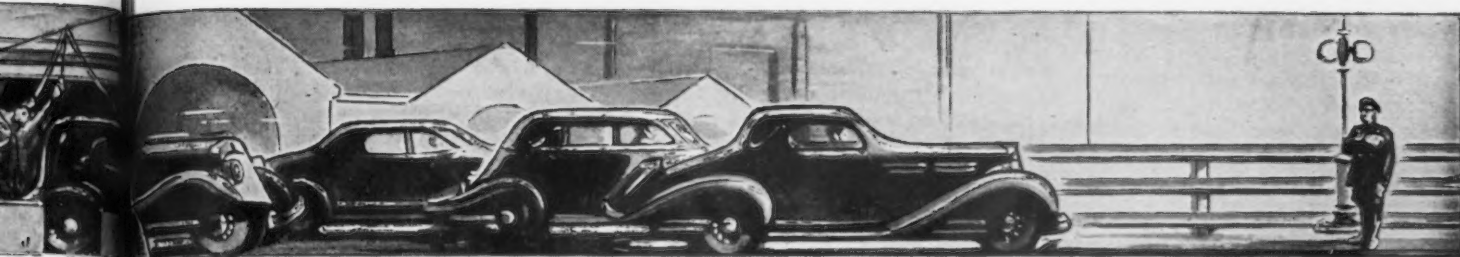
Retail car prices for 1936 seem likely to stay close to current

levels. If changes occur, they probably will be down rather than up. On the other hand, where savings are made in production costs, it may be that manufacturers will prefer to cling to present prices and put more into their cars in either quantity or quality or both.

Car manufacturing expense is roughly figured at so much per pound. On that basis it is virtually certain that the cost will be less in 1936 than in 1935. For one thing, all manufacturers are counting on increased volume and that in itself quickly lowers the cost per unit after a certain point has been passed. Aside from that consideration, however, there are other factors which should contribute to production savings.

Labor Costs to Decrease

Elimination of NRA will be responsible for a considerable reduction in costs. The hourly stipulations of the automobile code proved irksome and very expensive to tens of thousands of workers as well as to management. Restrictions on maximum hours, for example, made it necessary to curtail operations or hire an extra shift. In the case of one important manufacturer, the decision was made to produce as much as possible with two shifts, but not employ a third shift. The management figured that by the time it got the extra shift trained to average efficiency, the seasonal peak would be about over. Meanwhile, it would run up its costs be-



ASSEMBLY LINE

cause of the inexperience of several thousand workmen. This is aside from the bad feeling engendered in the extra men by taking them on and then having to lay them off within a comparatively short time. When it completed its calculations, the management decided it was better off to lose 30,000 cars from its maximum schedule rather than take all the grief that went with employment of an extra shift.

One of the industry's most respected production executives says that car manufacturers can operate at the highest efficiency when they have a range in hours employed per week from a low of 32 up to a maximum in the spring of 54. There is bound to be some stretching of hours with the passing of NRA codes and this will help bring lower costs without decreasing wages.

The likelihood of driving down parts prices is strong. Already two car manufacturers are soliciting quotations on 1936 contracts and are opening the door wide for every possible supplier to enter bids. Apparently neither company has baldly stated that prices must be lower in order to get next year's business, but the inferences are numerous enough that a direct statement would be superfluous. Because of this situation there is much apprehension on the part of parts manufacturers regarding their ability to maintain standards which have prevailed the past year.

Fall announcements of new models are not regarded as a complete solution of the seasonal employment problem. At best only about half of the automobile workers are engaged in the fabrication of parts, the other half being employed in the assembly of cars. No practical method has been devised of building complete cars and storing them. Thus approximately

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

o o o

50 per cent of the industry's workers still will be employed according to the buying whims of the public.

Chevrolet to Store Parts Ahead

In connection with the building of parts ahead during the winter months, thereby lopping off the sharp peak in the spring, Chevrolet is quietly arranging for warehouse space in cities where it possesses branch assembly plants. It is expected to manufacture about 125,000 parts ahead of its assembly requirements and keep that bank in storage through most of its season until the clean-up period arrives. No doubt this program was inspired not only by a desire to smooth out the employment curve, but also by the memory of having been caught short of transmissions when the men at Toledo struck recently.

Equipment buying is coming along with a rush. Plymouth has placed some orders for machinery to plug up weak spots in its production lines. Its total expenditures probably will run around \$300,000. Dodge is considering purchases of machinery in the near future. Oldsmobile has made further machine tool commitments, some of which have been in connection with its change over to aluminum pistons in its 1936 cars. Buick has bought more equipment and is understood to be contemplating further outlay for new machinery.

Chevrolet is reported to be spending close to \$2,000,000 for equipment at its local gear and axle plant. Some of the machinery is to

be used in the production of hydraulic brakes, which both Chevrolet and Buick will adopt for 1936. General Motors of Canada has taken bids on machine tools for the manufacture of transmissions at its St. Catherine's, Ont., plant. If its program goes through without alteration, it will make capital expenditures of \$350,000 to \$400,000. Studebaker has placed some machine tool business in connection with changes for next year's models. Electro-Motive Corp., General Motors subsidiary, is about to make purchases of heavy machinery for its new plant now being built at Chicago for the manufacture of Diesel electric locomotives.

A large amount of equipment buying is expected to be done by the automotive industry in the next 30 days. In some cases, where the object is to increase production facilities and the extra capacity will not be needed until early next spring, companies are giving machine tool builders until Dec. 1 to make and install the new equipment.

Knee Action to Stay

No change is anticipated next year in the General Motors line-up on knee action. Cars which now have this feature will retain it and the Chevrolet and Pontiac standard series will be without it. All General Motors cars will possess hydraulic brakes and turret tops. Ford, with large presses installed at the Rouge plant in the last year and with the help of Briggs, which also has presses of unusual size, is in a position to go to production of all-steel tops next year. Hudson is said to be putting in new press equipment which may foreshadow a change in its method of fabricating its steel top, which is now welded into position in the space formerly occupied by the fabric top. Chrysler, having advertised

LOOK TO YOUR BRIDGES



The machine tool industry cannot and does not stand still. Research, coupled with hard work, constantly produces better methods, or lower costs, or speeds production.

Machine tools—like automobiles—grow old. You could not demand 1935 performance of a 1920 car. But countless outmoded machine tools are struggling with 1935 production.

A big gap exists between those old machines and 1935 cost cutting equipment. That gap widens with every advance in machine tool design.

The shop that bridges the gap with proper new equipment as the need arises will make money. Too many companies are spending money patching, when the same money *plus the savings made* would replace. It is simple arithmetic.

Look to your bridges!

PRATT & WHITNEY CO.
HARTFORD, CONNECTICUT



This is the first of a series of advertisements by Pratt & Whitney to show the changes in machine tool design and what they mean.

all-steel bodies for years, is in the embarrassing position of seeing General Motors forge ahead of it with the turret top. No one appears to know definitely what it will do in 1936 about the steel top.

Budd is entering the automobile frame manufacturing business with a contract from Chevrolet covering requirements for assembly plants east of the Alleghenies and on the Pacific Coast, supplying a territory which is understood to have taken about 30 per cent of Chevrolet's production. The frame to be made by Budd is reported to be of such design that greater strength can be attained with lighter gage steel. It consists of a much deeper channel than heretofore onto which is welded a steel plate. The final product is totally-enclosed, suggesting a tubular design except that the shape is rectangular rather than round.

Stamping Companies Complain

Stamping companies are grumbling over the growing practice of some steel mills of blanking sheets at the mill before shipping them to automotive customers. While this practice may save money by eliminating extra haulage of scrap, nevertheless it is depriving stamping plants of business which they think should be theirs. Several companies, in an attempt to retaliate, have decided to give more of their tonnage to mills which have not installed press equipment.

Automobile production has been holding up well. Assemblies this month should be around 375,000 units. Chevrolet has 115,000 jobs scheduled and Ford approximately the same number. Chrysler should make about 70,000 to 75,000 cars in June. July operations are yet an uncertain quantity. Leanest period of the year probably will be from Aug. 1 to Sept. 15. With every company bending its efforts to turn out adequate dealers' stocks by the time of the New York show, output in October should be fairly good.

Small steel buys were made by some General Motors divisions the past week, having been in the nature of a final clean-up for current models. Ford is expected to be out of the steel market for at least 60 days. What little buying will be done by automotive plants in the next few weeks will be mainly for die tryouts.

July Production Schedules High

Tentative automotive schedules for July place the total at a minimum of around 300,000 units. While a slump is anticipated in both Ford and Chrysler operations, General Motors will give strong support to the market. Chevrolet, with 115,000 cars and trucks coming off its

lines this month, has approximately the same volume projected for July. Pontiac and Olds have relatively good operations planned for next month as they prepare to clean up work on present models about Aug. 8. Most Fisher Body plants will continue at or near full capacity for the next 30 days.

Chevrolet has made generous steel commitments during the past week. Ford will run continuously through July, attaining a schedule which it had set up for that month earlier in the year. Retail car sales have been sustained at close to the year's peak, showing a vigor which foreshadows an active market through the summer.

Detroit Notes

Henry Ford, at the ceremonies last Thursday in connection with the production of the two millionth V-eight car, said that he will build the three millionth in "less than a year." . . . Ford is completely air conditioning its administration building on Schaefer Road, its engineering laboratories at Dearborn

and Dearborn Inn. . . . For the first time in years, the Soviet commission negotiating for equipment purchases for Autostroy is said to be willing to pay cash, provided that American machine tool builders agree to a sufficiently liberal discount. . . . The National Automobile Dealers' Association, fighting for what it considers a more equitable contract with manufacturers, is being championed by Father Coughlin. . . . The story persists that General Motors will make transmissions in an idle plant at Saginaw, thus breaking up the concentration of so much transmission work at the Buick factory at Flint.

The annual meeting of the Plain Washer Manufacturers Association will be held at the Hotel New Yorker, New York, June 26, at 10 a. m. Part of the program will be a golf tournament to be held at one of the New York country clubs on the day following the meeting.

Editor's Note: This is a series of observations which, strangely enough, are exactly what they purport to be. In other words, they come from the daily diary of a real boss; a prominent executive in the metal-working industry who prefers to remain an anonymous author.

The Boss's Diary

The problem before the home now is where to send E— for further education. She is the last in the family to come up for this heavy consideration. In a few weeks she will graduate from High School. In this school she has had excellent oversight and the home authorities are eminently satisfied with all that's been done with her, but from now on it's another story.

What with Brain Trusters, Reds, Radicals and Free Thinkers reported to be riding high in our colleges, it sure engenders a parental sigh. But who knows? Probably in another twenty-five years her generation will look back and say, "How old fashioned those Brain Trusters, Reds, Radicals and Free Thinkers were back in 1935."

It's my guess, however, that they'll be so busy raising the interest on our accumulating indebtedness that her generation won't do much but cuss us for our extravagance.



BY L. W. MOFFETT

Resident Washington Editor,
The Iron Age

WASHINGTON, June 18.—NRA zealots actually appear to be disappointed that the slaughter of the Blue Eagle did not bring about industrial chaos. . . . In doleful tones they predicted that the death of the old bird would be followed immediately by a collapse of the price, wage and hour structure. . . . Sweat shops were expected to spring up like mushrooms. . . . Organized labor made a "careful" survey and announced a breakdown in wages and hours in almost every industry of the country. . . . But it was unable to submit proof, and, on the contrary, was met with specific denials. . . . The breaks were largely confined to retail lines and small industries. . . .

Even in official quarters the press was apparently encouraged to headline the dour chant, "The Skies are Falling Down," until the lamentations of Jeremiah, by comparison, sounded like a tale of joy. . . . It was not doubted that there would be some wage cuts, lengthening of hours and a break in prices with the collapse of NRA and its change to the present skeletonized form, but breaks were already under way before the Supreme Court sounded the doom of this premier alphabetical recovery agency. . . . It simply had taken in more territory than it could

police. . . . it had faded sadly, and the more it was ballyhooed the greater became consumer hostility toward it. . . . perhaps it was unfair to blame NRA entirely for the fast mounting costs that outdistanced income. . . . A great deal of the criticism might better have been directed at the sacred AAA, to be preserved at all costs, that is, costs to the consumer. . . . For if a single letter were scathed, there would be another march on Washington by embattled farmers with not a single callous in a carload. . . . And its implications are smelled from afar by politicians, without regard to creed, already headed well into the 1936 campaign. . . .

But the campaign of fright did not stop the Senate from insisting on a perfectly innocuous NRA. . . . although House leaders at first tore their hair and shouted that

they would not accept the Borah amendment restoring the anti-trust laws. . . . Then they quietly acceded after being called to the White House and told to sign on the dotted line. . . . It was only a shout, meant for home consumption and perhaps to maintain a semblance of House dignity, if any. . . . Racing toward the deadline, June 16, expiration date of the original blown-in-the-bottle NIRA, the House leaders knew they had to swallow the Senate bill because they would not dare let the Blue Eagle disappear completely. . . . A patchwork skeleton had to be preserved for Smithsonian Institution. . . . and Huey Long's 15½-hr. wind-jamming marathon, in any event, barred time for any changes. Many Administration supporters had tongue-in-cheek as they wept in the crying towel over NRA. . . .

Once the White House reconciled

THIS WEEK IN WASHINGTON

Reorganized NRA begins to function with strong organized labor representation on its advisory board.

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Industries are urged to eradicate unfair trade practices under powers of Federal Trade Commission Act.

o o o

Durable goods industries oppose new plan for spending works relief funds according to mathematical formula.

o o o

New administrator of NRA has had 22 years experience in steel industry.

o o o

Proposed legislation to require contractors getting Government work to maintain minimum wages and maximum hours likely to be used as a club over industry.

itself to the Senate bill for voluntary trade agreements based on collective bargaining, minimum wages, maximum hours, fair trade practices, the latter a la the Borah amendment, not to violate the anti-trust laws, the President was eager to sign the new act and did so shortly after its passage last Friday. . . .

Reports persist that the Administration has in mind a real revived NRA, Supreme Court-proof, and that it will be offered later in the present session, greatly adding to the session's interminable aspect. . . . Leaders in Congress insist they know of no such plan. . . . The usual uncertainty prevails and this has become so commonplace because of the Washington policy that the nation would feel out of place, even though more comfortable, if it were not kept on tenterhooks. . . .

It is seriously doubted, however, that unless the country becomes more excited than it has so far over the ill-fate of the Blue Eagle, the skeleton will not be hauled before the present Congress for taxidermic treatment . . . and of course even if a constitutional amendment is in mind it is a matter of the rather distant future. . . .

The important fact remains that the major industries entered upon voluntary agreements to maintain code structures shortly after the Supreme Court decision. . . . Administration officials plainly are skeptical of the ability of industry to stick to these agreements, have no faith in the NRA plan of agreements, because of no enforcement powers back of them, plus the anti-trust amendment, and sniff at state compacts . . . yet it is realized that if these agreements are adhered to without fear of prosecution, there will be no taste left for another full-bloomed NRA. . . . Organized labor's feigned craving for NRA and its "alarm" over a breakdown of code structures might well be tucked away in moth balls, too . . . for with Administration support having assured passage of the Wagner-Connery bill, the Guffey coal nationalization bill, and social security legislation, A. F. of L. hunger has been replaced by a rather full larder. . . . Its campaign of fright was quite fruitful in bringing about the more abundant life—more abundant at least for labor leaders now confidently expecting many more dues-paying members. . . .

At the height of its power, and bygone days of its power are recalled, organized labor never forced more relentlessly its demands than it did for this legislation . . . the United Mine Workers, thanks par-

tially to support of many coal operators, with their demand for the Guffey bill or else a "strike" on June 17 of hundreds of thousands of miners did a pretty job. . . . Especially when it is doubted that even in the event of a "strike" it would have been more than an abortive laying down of tools. . . . They are the only nationally recognized union and according to the terms of the bill they will therefore be the exclusive agency of collective bargaining. . . . They will virtually run the industry, providing "allocations," seeing that the 25 per cent penalty tax provision is carried out to suit themselves, though ostensibly the National Coal Commission will be the agency for administration of the act. . . . And it will be interesting to see the drive on the Federal treasury with its \$300,000,000 fund as marginal coal lands, with little or no value, are dumped on the tax paying public. . . . Captive mines, owned by steel companies, which, one would think, would not fit into this scheme of "economic planning," are nevertheless included in the layout. . . . Unconstitutional, say leading lawyers, as they say of the Wagner-Connery bill and the social security bill, but the constitution is nothing between friends, as a former Republican official once facetiously remarked. . . . The Schechter case was a sharp remainder of a contrary view but much headway can be done through experimentation before test cases can get to the highest court of the land. . . . Anyhow the White House conference with officials of the United Mine Workers "averted a coal strike" until June 30. . . . What a fine breathing spell during which wage contracts and other obstacles likely will be ironed out and the touted disaster thus avoided . . . though it would not be surprising if mining of coal was suspended about that time in view of large coal stocks already on hand.

The Guffey bill has been called a little NRA. . . . The question arises, however, if, in the event it can stand court tests, it will not set a precedent for an NRA larger than NRA was when running at full capacity. . . . The system to assure fixed minimum prices in the coal industry has a real kick in it. . . . A violation would mean a 25 per cent tax on the price of the coal against the operator . . . lifting up to the price structure he would get a 99 per cent drawback . . . there is talk that this NRA substitute may be tested with a view to extending it to all industries. . . . Which perhaps is a pipe dream of brain trusters, who hope for extension of the public utility

holding bill, slated for early passage, to all holding companies. . . .

What industry salvages out of the new NRA act rests largely with itself. . . . Steel certainly was a top notch industry in adhering to its code and its agreement to continue code hours and wages clearly shows it proposes to salvage the best parts of the code. . . . Organized labor "sub rosa" talk shouted aloud, that there have been breaks in steel wages, hours and prices, is recognized as a movement to unionize the industry. . . . A movement it hopes to further greatly now that the Wagner-Connery bill promises soon to become a law, and now that the extended NRA calls for collective bargaining. . . . Not that the industry, or sections of it, has not long been engaged in collective bargaining. . . . Rather that organized labor seeks to be the sole agency for that purpose and will make the most of the Wagner-Connery bill to abolish "company dominated" unions or employee representation plans. . . . To this extent industry may find the "voluntary" agreement system irritating, if it seeks agreements through Washington channels. . . . Many think this feature will be one bar to efforts to make such agreements. . . . Also the thought prevails that the Borah amendment complicates the situation and makes such agreements entirely unsatisfactory. . . . While the Chamber of Commerce of the United States doesn't like the new NRA act and, through President Harper Sibley, thinks the Borah amendment injects new uncertainties into the business situation, the view is held that the future of voluntary cooperation to bring about fair competition is not hopeless. . . . It is his view that much can be accomplished toward the eradication of unfair trade practices and establishment of fair competition by taking advantage of the Federal Trade Commission Act. . . . He urged resort to the Federal courts for "declaratory" opinions on the effect of the anti-trust laws under a Congressional act passed one year ago giving Federal courts authority "to hand down declaratory judgments." . . . The steel industry and the Federal Trade Commission, however, have not hit it up well together. . . . There is even complaint by some who urge cooperation with the commission for establishing trade practices that the commission has been treated like Orphan Annie by the Administration, though the Administration actually in some of its activities has turned over some important work to the FTC . . . the FTC would find sweet revenge

in taking over NRA work, for the former considers that NRA took away FTC's own little darling. . . .

The FTC and the steel industry for some 15 years have been at loggerheads over what Senator Clark of Missouri calls the "base rate" system. . . . If trade agreements were negotiated with the FTC would this irritating issue crop up? . . . FTC's insistence on a mill basing system obviously would get nowhere with the industry. . . . FTC also has kicked vigorously about steel extras. . . . Would it demand a sweeping downward revision of these extras or even acknowledge them or any other price factor? . . . On the other hand, it has been suggested that these controversial matters might be disregarded entirely and the industry continue to proceed under the existing basing point system, expanded under NRA, and leave extras unchanged, though subject to revision. . . . Would the commission approve certain provisions to eliminate unfair trade practices, such as false billing? . . . The queries themselves indicate the uncertainties. . . . They signify that many industries might well prefer to go on their own agreements without official help, though applications for trade agreements have been made to FTC in increasing number since the Schechter decision. . . .

Donald R. Richberg, retiring NRA head and former administration member of the steel code, thinks the NRA, in its skeletonized form, can do much good for industry. . . . His idea is that it might do much in the way of studying the anti-trust laws and distribution methods as they affect industry. . . . On the score of distribution, Mr. Richberg at his final press conference last Thursday pointed out that the country can already produce far beyond its effective capacity to consume. . . . The question, he says, is whether there can be an increase in distribution to match effective capacity. . . . The big job ahead for NRA, in his opinion, is to reduce in compact form its mass of experience to be "studied as a problem in conduct" . . . from which he believes NRA could get "valuable judgment and appraise benefits and detriments of the entire NRA program." . . . One study to be presented by deputy administrators will cover complete records of the operation of all codes. . . .

Colorado Steel Company Suffers from Long-and-Short Haul Provision

The tonnage of its products sold on the Pacific Coast by the Colorado Fuel & Iron Co. has declined

from more than 250,000 tons in the year preceding the withdrawal of relief from the long-and-short haul rule to an average of 87,078 tons in the last five-year period, according to Ward Wire, traffic manager of that company. Mr. Wire was among the last group of many witnesses who for two weeks testified before the House subcommittee on interstate commerce in behalf of the Pettengill bill for repeal of the long-and-short haul clause. Shippers from all sections of the country joined the railroads in supporting the bill.

The opposition, however, which is also strong, began presenting its views yesterday. Opponents contend that repeal of the clause would permit higher rates between intermediate or short-haul points than for long hauls on the same route. Shippers, in joining railroads, however, have insisted it is necessary that carriers be permitted to meet competition with water lines by charging less for a long haul than for a shorter haul to intermediate points.

"We have employed some 13,000 men," Mr. Wire told the subcommittee, "with an annual payroll of \$9,000,000 in round figures at our peaks.

"The history of the company is so replete with illustrations of its advance and decline during periods of favorable or unfavorable freight rate adjustments, that it may fairly be said the freight rate structure is the controlling factor in its fight for existence.

"In the distribution of our finished products we cannot rely entirely on the large, sparsely settled area, which, although developing, does not require sufficient steel products to enable us to conduct our operations profitably. We must, therefore, have access to the larger consuming areas, the Pacific Coast and lower Texas markets, where the consumption of steel products is extensive. Water competition through the Panama Canal to Pacific Coast points and via the Gulf to Texas ports has practically closed those markets to us in so far as any volume of tonnage is concerned."

Two Industries Submit Voluntary Trade Agreements To NRA

Procedure of the new NRA is being given study by its Advisory Council, which began a survey of the question yesterday afternoon following its reorganization through Presidential order.

James L. O'Neill, acting administrator of the organization, announced that two voluntary trade agreements already have been pro-

posed in Washington, one for the asphalt shingle roofing industry and one for the asbestos industry, while 14 unnamed industries in New York have proposed agreements for submission to NRA. Mr. O'Neill said that the agreements will not be considered by NRA until the policy of procedure has been determined. Until then it is not known whether there will be hearings on the proposed agreements.

"Industry first may be expected to ask for trade agreements as trial balloons," said Mr. O'Neill, "but the form they will take when finally worked out through NRA cannot be known at this time.

"The most pressing problem confronting the National Recovery Administration is adjustment of the organization and its personnel to the work to be done during the coming months. That adjustment cannot be made intelligently without planning the work itself. The next few weeks will be devoted to developing such plans, and announcements will be made as soon as possible concerning appropriate changes in personnel. Pending this adjustment and in order to afford an opportunity for orderly procedure, I am adopting and confirming the action of the National Industrial Recovery Board in continuing our personnel in their present capacities on a temporary basis until further order."

Mr. O'Neill said it is not known how many of the organization will be retained. The matter rests partially with the question as to whether the Administration's pending legislation covering Government contracts will be administered by NRA. If it is, the personnel will be larger than it would be otherwise, though a sharp reduction seems inevitable. The legislation would require contractors getting Government business to maintain minimum wages, and maximum hours.

In working out its survey to determine what can be allowed in voluntary trade agreements, Mr. O'Neill stated that the Advisory Council will cooperate with other divisions of the NRA set up under the new organization. The old divisions which had charge of groups of industries, the Research and Planning Board and other units of the original NRA have been abolished. The nine regional offices have been closed and their heads will write a history of the codes which they effected.

The Advisory Council in the course of its work will seek a plan of cooperation by States for NRA and also is studying plans for further and broadened NRA legislation at the present session of Congress.

Durable Goods Industries Protest New Plans for Public Work Expenditures

WASHINGTON, June 18.—The formula for the \$4,000,000,000 work relief program, as officially announced yesterday by President Roosevelt to 48 Federal administrators, one for each State, is the object of protest from representatives of the durable goods industries. It is being attacked as offering only a minimum of stimulus to these industries and to be a return to the old CWA program of waste and useless employment. The President told the administrators of the necessity for putting 3,500,000 men to work and conceded that relatively little would be expended for materials.

"Outside of a handful of strictly Federal projects, calling for a very small portion of the \$4,000,000,000," the President said, "practically all of the rest of the money must be spent at an average of \$1,100 to \$1,200 per man which must include everything, including materials."

Despite his admonition to make the projects "as useful as possible" and to avoid politics, charges are being made that politics inevitably will play a large part in the expenditure of the huge sum.

Hopkins to Supervise

The program is to be under the supervision of Harry L. Hopkins, Federal Relief Administrator. It conflicts directly with plans of Harold L. Ickes, Public Works Administrator, now almost out of the picture. Mr. Ickes favored the expenditure of relatively large sums for materials, insisting that this plan would put more men to work than will be engaged by the "mathematical" formula determined upon for "made" work to fit requirements of each locality.

The new plan clearly indicates that there will not be nearly as much expended as had been hoped for for grade crossing elimination, electrification, housing, highway construction, etc. Reaction against the program came quickly from two sources, the American Road Builders Association and the Advisory Council of the Construction League of the United States.

President William P. McDonald of the road builders association, allowing \$1,400 for each man per year, said the figure would be insufficient to provide for the construction of anything but low cost improvements. Rather than re-

lieve employment," he said, "it will compel industry to lay off men and add them to the relief rolls.

Willard Chevalier, vice-president, McGraw-Hill Publishing Co., a member of the Advisory Council of the Construction League, attacked the program as a "basic fallacy."

Long Delay Preceded

In the protracted negotiations which preceded the President's announcement yesterday, Harold L. Ickes, public works administrator, had declared that "simple mathematics" show that 3,500,000 people cannot be put to work on useful projects and necessary materials purchased for \$4,000,000,000. It was the fixed opinion of Mr. Ickes that the money should be expended to provide indirect aid to the heavy industries through the purchase of supplies and materials. The direct employment, it is contended, would be less than would result from the conflicting plan of Harry Hopkins, head of the progress division, who insisted that the principal job of the Government is to put people directly to work and fit jobs to the relief needs of communities. Under his plan it is clear that many of the useful projects for which original allotments were made can not be undertaken. Instead there would be a program of "boon dogging" and "made" work, and other types of "jobs" as a means of engaging 3,500,000 now on relief rolls. It is estimated that not more than 30 per cent of those on relief rolls are fitted for any type of construction work requiring skill or experience. Because President Roosevelt is said to be holding to his plan to put 3,500,000 persons directly to "work," it is reported that he is leaning to the Hopkins plan as against the Ickes proposal under which it is estimated 2,000,000 would be put directly to work and the remainder of the 3,500,000 put to work indirectly in the production of materials, with the resulting stimulus to the heavy goods industries.

The "Grant and Loan" Plan

The existing plan for PWA projects is to make grants of 5 per cent of the cost of a project and to make a loan for the remainder or to require that the remainder of the money be supplied by the local community. Figures compiled by PWA show that 4108 completed

projects have cost about \$2,000 per man per year, this including the total cost. Based on this calculation if the Government should stand all the cost of similar projects only 2,000,000 could be put directly to work. It was stated that the works program must be gaged so that the cost per man per year will not exceed \$1,140, if 3,500,000 are employed. The grade-crossing elimination plan provides for \$1,400 as the total expenditure for labor, materials and incidentals per man per year, or on a basis of 40 per cent of the total cost, including cost of property to go to labor directly employed on the project.

The greater proportion of allotments already made under the works program, aggregating \$1,000,000,000, will require a great deal higher expenditure than either figure, some running as much as \$3,000 per man. Because of this it is reported that rural resettlement work is being held up because land purchases would require so much money that the average available to take men off relief rolls would be reduced considerably.

The necessity for keeping the average cost per man down will make future reclamation projects "very difficult," Mr. Ickes said. On the other hand, he stated that housing, calling for high material costs, is an exception to the rule.

Mr. Ickes is adhering to his policy that the first requirement of any works project is that it be economically justifiable. He maintains that indirect work created by such projects is probably more important than work on the site.

The differences between Mr. Ickes and Mr. Hopkins apparently will have to be settled by Frank C. Walker, head of the Division of Applications and Information, if not by the President himself.

Railroad Crossing Elimination

Meanwhile the Bureau of Public Roads has forwarded advance information to State highway departments for use in planning programs for the elimination of hazards at railroad crossings. The State highway departments have been advised that the \$200,000,000 allocated for the grade-crossing program may be used for projects without limitation as to location except that not less than 25 per cent of the states' apportionment shall be applied to crossings with secondary or feeder roads. It was stated that this method of distribution will not be permitted to operate to prevent the elimination of hazards at main-line crossings of railroads that have only a relatively small mileage in a state.

High-speed electric lines may be considered on the same basis as railroads.

The funds apportioned for this program are to be available to pay the entire cost of projects of the following character exclusive of any charges for rights of way or property damage:

The separation of grades at crossings.

The protection of grade crossings.

Reorganized NRA Begins Functioning As Fact-Finding Body—Personnel New

WASHINGTON, June 18.—Reorganized for the third time during the two years of its feverish existence, NRA, reduced to a "fact-finding," skeletonized, alphabetical agency, again has been established as a single-headed body with strong, if not dominating, organized labor representation on its new Advisory Council.

Knocked into a cocked hat by the Supreme Court decision in the Schechter poultry case, the remnant of this prime "recovery" organization of the New Deal was set up under an executive order issued Sunday by the President, within a few hours before expiration of the legal limitation of the original act. The order followed enactment by Congress of a law extending the life of the new NRA until April 1, 1936.

Fitted to the sweeping limitations laid down by the Supreme Court, the new act provides for voluntary trade agreements for fair trade practices, based upon requirements of Section 7-a, the establishing of minimum wages and maximum hours, together with the important amendment by Senator Borah which bars agreements that would be in violation of the anti-trust laws. So restrictive and uncertain is the new law that Administration officials freely predict that it will offer but little incentive to industry.

Not only is there skepticism as to the effectiveness of voluntary trade agreements, with no power of enforcement, but it was also pointed out that the anti-trust amendment, covering an undefined area, would discourage broad scale trade agreements. Likewise it has been stated in industrial circles that the advantages that might be gained easily could be offset by tur-

The reconstruction of existing railroad grade-crossing structures.

The relocation of highways to eliminate grade crossings.

The regulations, soon to be issued, will require that 90 per cent of the persons employed on any project, shall be obtained from relief rolls and all projects will be measured for approval on a basis of \$1,400 total expenditure for labor, materials and incidentals per man per year, or on a basis of 40 per cent of the total cost.

moil that again may arise from requirements as to Section 7-a. It is realized that even without encouraging injection of disputes under this section in connection with voluntary trade agreements, more than enough trouble lies ahead independent of voluntary agreements under Section 7-a.

O'Neill Former Steel Man

JAMES L. O'NEILL, acting administrator of the newly reorganized NRA, can talk the language of the steel trade. For 22 years he was credit manager of the Carnegie Steel Co., Pittsburgh, where he was born in 1881. Since 1918 he has been with the Guaranty Trust Co., New York, in charge of organization matters, operations throughout domestic and foreign branches, and personnel. His title at present is operating vice-president of the trust company, which has loaned Mr. O'Neill to NRA until Sept. 1. He has specialized in personnel management and coordination through a major part of his career. He entered business with the Bradstreet Co., predecessor of Dun & Bradstreet. Straightforward and business-like, Mr. O'Neill upon taking charge of NRA has stated that he is "just an ordinary man" with no political connections. He is a Republican, however. Unable at this time to give an outline as to the future of NRA, Mr. O'Neill has plainly stated that this is a matter to be determined by time and makes no effort to assume knowledge that can be known only by developments of NRA.

Labor Board Continued

This famous section was continued in the NRA extension resolution. Power of enforcement of the section, such as it may be, now rests with the National Labor Relations Board. This board, once disbanded by the President, along with six other labor boards, on the strength of the Supreme Court decision, was resurrected by executive order last Saturday. It is to be temporarily continued until July 1. The temporary continuance of the board was decided upon in anticipation of passage of the Wagner-Connery labor disputes bill. There are reports that other labor boards, including the National Steel Labor Relations Board, may be reestablished either with or without passage of the Wagner bill, assuming authority prevails for setting up these boards again.

The fact-finding NRA as it now exists goes back to its original administrative form with a single executive, and under him are a Division of Review, a Division of Business Cooperation and an Advisory Council.

Former Steel Man At Head

James L. O'Neill, vice-president of the Guaranty Trust Co., New York, recent control officer of NRA, and once credit manager of the Carnegie Steel Co., was appointed acting administrator. He was loaned by the Guaranty Trust Co. to serve until Sept. 1.

Leon C. Marshall, former member of NLRB, was appointed as head of the Division of Review. Mr. Marshall aroused criticism at the hands of some members of the old NLRB when he signed the recent report of the Brookings Institution which condemned the recovery act largely as a failure. Mr. Marshall, as a member of the institution, was said to have participated in the report only as to its factual matter.

Prentiss J. Coonley, former code administrator director, was appointed as director of the Division of Business Cooperation.

George L. Berry, president of the Printing Pressmen's Union, and former division administrator, was appointed as assistant to Mr. O'Neill, to represent labor.

The Advisory Council consists of six members of whom three are members of the American Federation of Labor. Some of the others have strong organized labor leanings. The members of the Advisory Council are: Charles Edison, former member of NLRB; Howell Cheney, New England silk manufacturer; Philip Murray, former member of the NLRB and vice-president of the United Mine Workers of America; William

Green, former member of the Labor Advisory Board and president of the American Federation of Labor; Emily Newell Blair, former chairman of the Consumers' Advisory Board, and Walton H. Hamilton, Yale University professor and former member of NIRA.

Plans New NRA Legislation

In his order setting up the new NRA, the President indicated plans for new NRA legislation. Later at NRA it was said that the Advisory Council will make a study looking to such legislation at the present session of Congress.

The President's order declared a "steady but gradual reduction of personnel" to be a sound public policy. "So long, however," it continued, as there is a possibility of further legislation, it will be desirable to maintain the general structure of the recovery administration in Washington and in field offices, and to retain these essential members of a trained personnel who can be usefully employed.

"There will be lasting values in a careful appraisal of the two-year accomplishments of the NRA and in preserving for permanent use the records of that experience. This can be done most effectively and economically by those heretofore engaged in the work of codification."

Purposes of New Body

The two principal purposes of the new NRA as set forth in the executive order are:

1. A study of the effects of fair competition and the results of their elimination. This work will be under Dr. Marshall.
2. Cooperation with business and industry in forming voluntary agreements. This work will be under the direction of Mr. Coonley.

Republic Merger Appeal Delayed

WHETHER or not the Republic-an-Corrigan, McKinney steel merger case will be appealed may not be known for several weeks. Formal decree in the suit instituted by the Department of Justice, which sought to prevent the consolidation and in which the Republic forces won a sweeping victory in a decision rendered by Judge Fred M. Raymond in Cleveland, May 3, was entered June 14, and the Department of Justice has 60 days, or until Aug. 13, to file an appeal in case it decides to carry the case to a higher court.

"Times" Warns Against Haste in Passing Social Security Bill

A NOTE of caution to Congress against haste in passing the social security bill was sounded June 17 by the New York Times, leading Democratic newspaper. That journal's comments were as follows:

The Senate seems to be on the verge of debating only perfunctorily and passing quickly the full Social Security Bill already passed by the House. It seems almost too late to hope that a measure of so sweeping a nature will receive the close and careful study it deserves. The case for splitting it into its constituent parts is a strong one. It would obviously be desirable to break it into at least three separate measures—one providing for immediate old-age assistance and Federal contributions for maternal and child aid, a second providing for unemployment insurance, and the third providing for permanent old-age insurance. Only after such a division would each section be likely to receive sufficient consideration, and to be voted upon as its merits deserve.

The whole contributory old-age pension scheme in particular ought to be postponed and turned over to an expert commission for study. As it

stands it imposes a gradually rising tax on both employers and employees, which at the end of ten years, it has been estimated, will amount to \$1,700,000,000 a year. This in itself would mean an added tax burden equal to nearly half of the existing total Federal tax burden. Further, it would result, it has been calculated, in the accumulation of an eventual reserve fund of the immense total of \$32,000,000,000. The problem of managing such a reserve fund, and its possible social and economic effects, have not yet received anything like adequate study. Alternative types of old-age pensions ought to be considered.

Nothing has yet been done, again, about amending the major defects of the unemployment insurance plan, as it stands. It still does not provide that the workers shall contribute toward their own insurance, in spite of the convincing arguments for this practice and the fact that it prevails in virtually every such system abroad. And it still, for no good reason that it would be possible to think of, levies a 3 per cent tax on the total payrolls of employers, instead of merely on that part which is paid to workers actually covered by the insurance benefits.

Malleable Foundry Industry to Continue Fair Practice Provisions of Former Code

THE malleable foundry industry has decided to continue operations on a voluntary basis under the malleable iron code of fair practices in order to retain the advantages that the industry has gained under code regulations. Action pledging members to continue to carry out matters of common interest that were covered under the code was taken at two meetings of the Malleable Founders' Society, comprising all members of the industry, held in Chicago, June 12, and in New York, June 13, and attended by members from the two sections of the country.

The society, which also acted as code authority for the industry under the NRA, will retain its present organization, and the funds that have accumulated in conducting its work as a code authority will be turned over to the society in its capacity as a voluntary organization.

The meetings were attended by officers of 92 per cent of the member companies representing fully 95 per cent of the volume of jobbing business in malleable castings, and the vote of those in attendance was unanimously in favor of con-

tinuing the fair practices regulations of the code. Resolutions adopted provided:

That rates of pay, hours of labor and standards of competition as set forth in the code be voluntarily adhered to.

That the average work week shall not exceed 40 hr. and that in no week shall an employee work more than 48 hr. The code allowed four peak weeks of not over 48 hr. in each six months' period, taking cognizance of the heavy operations during the peak periods of automobile production. The change as made conforms with the regulations provided in the automobile manufacturers code regarding maximum periods of work.

That members shall continue to make monthly wage and hours of employment reports to the society.

That the society shall continue to observe the provision of the code that prohibits unfair trade practices.

That field work in connection with the checking of labor records, and field work for investigation of trade complaints shall be continued.

That code regulations requiring members to install and use the improved cost system be continued. This cost system has already been installed by practically all the malleable iron foundries.

Borg-Warner Buys Calumet Steel Co.

ALL of the capital stock of the Calumet Steel Co., Chicago Heights, Ill., has been purchased by Borg-Warner Corpn. and now operates as a separate Borg-Warner subsidiary. Roy C. Ingersoll is the new president of the Calumet company. Mr. Ingersoll is a director of Borg-Warner Corpn. and president of the Ingersoll Steel & Disc Co., division of Borg-



R. C. INGERSOLL



F. G. CARREL

Warner. F. G. Carrel, formerly secretary of Calumet, has been named vice-president and Mathew Keck, secretary and treasurer.

Directors of the Calumet Steel Co. are R. C. Ingersoll, F. G. Carrel, S. L. Ingersoll, Frank Matthiessen and C. S. Davis. It is contemplated that in the near future the membership of the board will be enlarged to include, with others, Harold G. Ingersoll.

R. C. Ingersoll and his brothers

Harold G. Ingersoll and Stephen L. Ingersoll, both vice-presidents of the Ingersoll Steel division and directors of Borg-Warner Corpn., are well-known throughout the steel, implement and automotive trade, carrying on the tradition of their father, S. A. Ingersoll, who founded the Ingersoll company more than 50 years ago. H. G. Ingersoll operates the Ingersoll plant at New Castle, Ind. and S. L. Ingersoll was the originator of the well-known IngAclad stainless clad steel, an Ingersoll product. A large Ingersoll mill is also located in Chicago.

Mr. Carrel has been an officer and active in the management of the Calumet company for 21 years and was the organizer of the Rail Steel Bar Association of which organization he has been an active director and has supervised the Chicago office of that association.

The Calumet Steel Co. will continue to manufacture steel bars, shapes and various products rolled from standard section tee rails, and axle steel. Major products of the Calumet company include reinforcing steel for concrete construction, merchant bars, bed and bed spring steels, farm implement machinery and equipment steels, steel fence posts, structural steel tubing, wheelbarrow handles and farm gates.

Malleable Iron Industry Sees Code Benefits

THE malleable iron industry appears to be virtually unanimous in favor of continuing every phase of the code of that industry that can be adhered to in a legal way and believes that a satisfactory workable plan can be devised for a voluntary compliance to code provision.

The board of directors of the Malleable Founders Society, which also has been the Code Authority, at a meeting in Cleveland, June 6, discussed ways and means of retaining the gains the industry has made under the codes and called meetings of the entire industry to consider the subject. These meetings are being held this week, the western malleable iron foundrymen meeting in Chicago on Wednesday and those in the East meeting in New York on Thursday. Belief was expressed at the Cleveland meeting that wage conditions in the industry are now much better than before the code was placed in effect. That the malleable iron code has

been helpful in various other ways is the consensus of opinion of leaders in the industry. Provisions in the code which the industry hopes to have continued under voluntary agreement include those covering minimum wages, regulation of the work week and forbidding selling below costs.

Republic Employees Choose Representatives

EMPLOYEES of Republic Steel Corpn. in the Youngstown and other districts and of subsidiaries held their primary elections June 12 for employee representatives and these were followed June 14 by elections conducted by the employees themselves acting under the by-laws of their respective employee representation plans. Ninety-four per cent of the 23,515 employees working and eligible to vote participated in the primary. The candidates elected in the regular election will represent employees during the ensuing year in dealing with the management in all matters of collective bargaining.

Exactly 98.1 per cent of the eligible voters in the Buffalo district of the Republic corporation cast votes last week for the election of employee representatives who will negotiate all matters pertaining to wages, hours of labor and working conditions with the management. The percentage is higher than last year and compares favorably with the 95.5 per cent vote in the Republic organization as a whole.

New Book on Enamels Now Available

THE Twin City Printing Co., Champaign, Ill., has just published an authoritative and complete reference book on enamels, written by A. I. Andrews of the University of Illinois. Heretofore the technology of modern enameling has been available only in isolated and widely scattered technical papers, and this summary of the raw materials, properties and tests of enamels is particularly timely. A multitude of tables and curves present data and illustrate the working of detailed processes, and information is included on properties, opacity, acid resistance and color of enamels. The book has been read and approved by the Porcelain Enamel Institute.

Foundry Accident Rate Increases

A 50 PER CENT increase in the accident severity rate is shown for the foundry industry by 1934 figures just released by the National Safety Council, also a 2 per cent decrease in frequency rate.

These changes in accident rates may be compared with increases of 5 per cent in each rate for all industries in the Council's classification of 30 major industries. On the basis of the 1934 figures, the foundry industry ranks twenty-fourth in frequency and twenty-fifth in severity among the 30.

The foundry industry averaged 23.42 in frequency, as compared with 15.29 for all industries, and 2.21 in severity, as compared with 1.70. The foundry figures are based on reports from 95 organizations, whose employees worked 50,300,000 man-hours. The injury frequency rate is determined by the number of disabling injuries per million man-hours of work, and the injury severity rate on the number of days lost through injuries per one-thousand man-hours of work.

More Millions for Grand Coulee Dam

WASHINGTON, June 18.—Announcement was made today by Harold L. Ickes, public works administrator, that an additional allocation of \$23,000,000 for Grand Coulee dam in Washington has been recommended to the President by the Works Allotment Board.

Gear Makers Favor Keeping Code Hours

RESOLUTIONS relating to hours and wages were adopted at a special meeting of members of the American Gear Manufacturers Association, called by its Industrial Relations Committee, at the Penn-Lincoln Hotel, Wilkesburg, Pa., June 11.

The resolution relating to hours was as follows: Since the opinion of the majority of our industry that 40 hr. as a base is satisfactory, provided the limitations on overtime are removed, and that for computing payroll purposes the 40-hr. week should be established with unlimited overtime over 40 hr., provided time-and-a-half is paid for such overtime, we recommend this as the standard practice for the American Gear Manufacturers Association members.

It was also resolved that: The

wages paid in our industry have proved very satisfactory and we recommend that no downward revision be made.

TRADE NOTES

Ohio Seamless Tube Co., Shelby, Ohio, has appointed Joseph T. Ryerson & Son, Inc., Jersey City, Philadelphia and Boston, as exclusive sales representatives in the Atlantic Coast states of Ohio Special seamless mechanical tubing. Ryerson will carry complete stock of seamless mechanical tubing in Jersey City and Philadelphia warehouses.

Moore Enameling & Mfg. Co., West Lafayette, Ohio, manufacturer of high grade enamel ware, has introduced to the trade new type of stain and acid proofed enamel ware which is selling under the trade mark Marblart. This ware is made by new process. Company has filed application for a patent upon new ware and process of making it.

Kirkby Machinery & Supply Co., 20-22 St. Clair Street, Toledo, Ohio, has been made a distributor by the Diamond Chain & Mfg. Co., Indianapolis. Stocks of roller chain of various pitches—sprockets and flexible couplings are carried for prompt service.

Marshall & Hushart Machinery Co., Chicago, has moved from the first to the fifth floor at 571 West Washington Boulevard.

Woodward & McMillan, Aptdo. 1691, Edificio Metropolitana, Havana, Cuba, have been appointed exclusive representatives by the Link-Belt Co. for its line of industrial elevating, conveying and power transmitting chains and machinery in Cuba.

Adrenalin for the Blue Eagle?

THE general impression that the Blue Eagle is dead and that the new NRA will be a mere fact-finding body may be erroneous if the fears of some industrialists are well founded. The bill introduced by Senator Walsh covering Government contracts is believed to be the club that the Administration will use to recover the power over industry that was taken away from it by the Supreme Court. The bill requires that contractors getting Government business shall agree to maintain wage and hour standards and avoid the use of child labor.

While there is no allusion to collective bargaining, there is a question whether observance of Section 7-a will not be required in view of the provisions in the new NRA act specifying adherence to the provisions of that section. In other words, the question arises whether industries will be forced to submit voluntary codes under the new NRA in order to qualify for Government contracts. If they do so, will they not vacate their constitutional rights so far as industrial relations are concerned.

OBITUARY

ROBERT L. OTTKE, vice-president, Standard Sanitary Mfg. Co., Pittsburgh, died on June 14 from injuries received in an automobile accident last February. He was 46 years old. A native of Cincinnati, he was educated in Louisville, Ky. He had been associated with the Standard Sanitary Company for practically his entire business life.

♦ ♦ ♦

GEORGE F. WATTS, president of the Watts Steel Construction Co., Boston, died on June 12 while supervising construction of a club house at the Suffolk Down track, East Boston. Formerly he was in business in New York and New Jersey.

♦ ♦ ♦

H. MERRITT KINSEY, assistant manager of the American Brass Co., Buffalo, died at his home in Niagara Falls, June 8, aged 44 years. He entered the employ of the Brass company 15 years ago. He was a past president and honorary member of the Industrial Relations Association of Buffalo, and a former director of the Western New York Credit Association.

♦ ♦ ♦

EARL C. SMITH, first sales manager of the Osgood Co., Marion, Ohio, and continuously identified with that company since 1910, died on June 11, aged 55 years.

NRA Board to Study Effects of Code Abolition

WASHINGTON, June 18.—President Roosevelt today in a letter to Chairman O'Neill of NRA asked that the latter set up under the division of business cooperation a board to study effects of code abolition concerning the extent to which changes have occurred in the maintenance of labor standards of fair trade practices. The President suggested an impartial chairman, one representative of labor, chosen by the Department of Labor, and one representative of industry, chosen by the Department of Commerce. The board will gather information from field sources throughout the country. It will be published, according to the President's letter to "counteract any propaganda from private sources which may be designed to promote a special interest."

▲ ▲ ▲ Capital Goods Industries

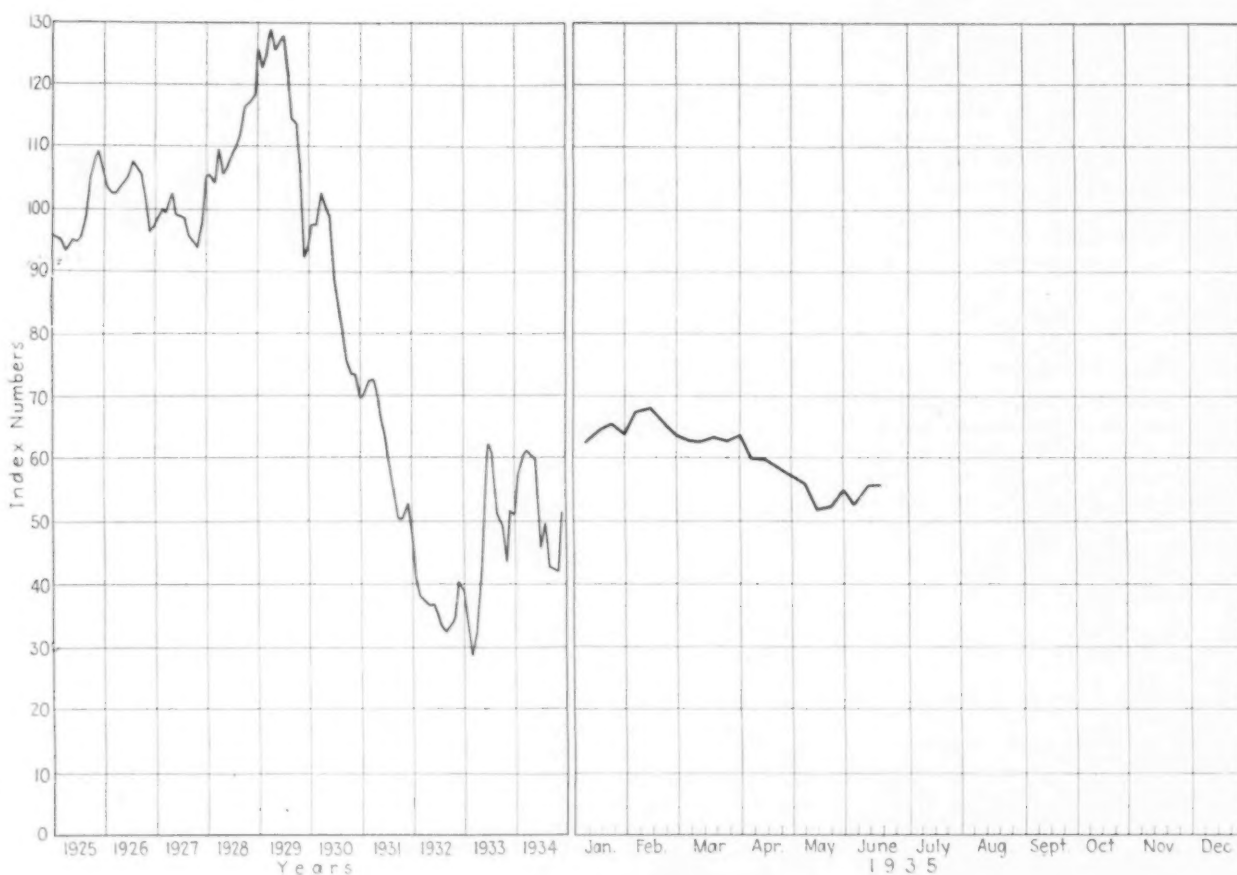
ACTIVITY in the capital goods industries, as measured by THE IRON AGE weekly index, has recovered appreciably from the low point of this year, reached in

last year, but above 1932 and 1933.

The recent rise in the index, which has occurred in spite of a decline in steel mill activity, is attributable largely to improvement

in the automobile industry, slight gains in construction and lumber and increased activity in the Pittsburgh industrial district, as reflected in the index of the Pitts-

The Iron Age Index of Capital Goods Activity. The years 1925 to 1934 are plotted by months, the current year by weeks.



the second week of May. The estimated index number for last week was 55.2 per cent of the 1925-27 average, showing no change from the preceding week. In spite of a gain of nearly 7 per cent during the past month and a half, the figure for last week is still substantially below the high point of 68 for the current year, which was established in the second week of February. The current rate of activity, moreover, is below that of the corresponding week of

The Iron Age Weekly Index Numbers of Capital Goods Activity

(1925-27 Average = 100)

Last week.....	55.2
Preceding week.....	55.2
Same week last month.....	55.2
Same week 1934.....	62.0
Same week 1933.....	51.1
Same week 1932.....	37.6
Same week 1931.....	67.4
Same week 1930.....	100.1
Same week 1929.....	127.4

burgh Bureau of Business Research.

A revision in THE IRON AGE index has been necessitated by the discontinuance of the weekly statistics on lumber production in the United States, formerly compiled by the National Lumber Manufacturers Association. In place of this series there has been substituted "revenue freight carloadings of forest products" as published weekly by the Association of American Railroads. These figures, which measure the weekly shipment of

More Active ▲ ▲ ▲

lumber, logs and similar products, furnish a reliable measure of activity in the lumber and logging industry. As in the case of other data included in THE IRON AGE index, the new series has been adjusted for length of the working week and for normal seasonal variations.

Capital Goods Industries Two Years Behind Schedule

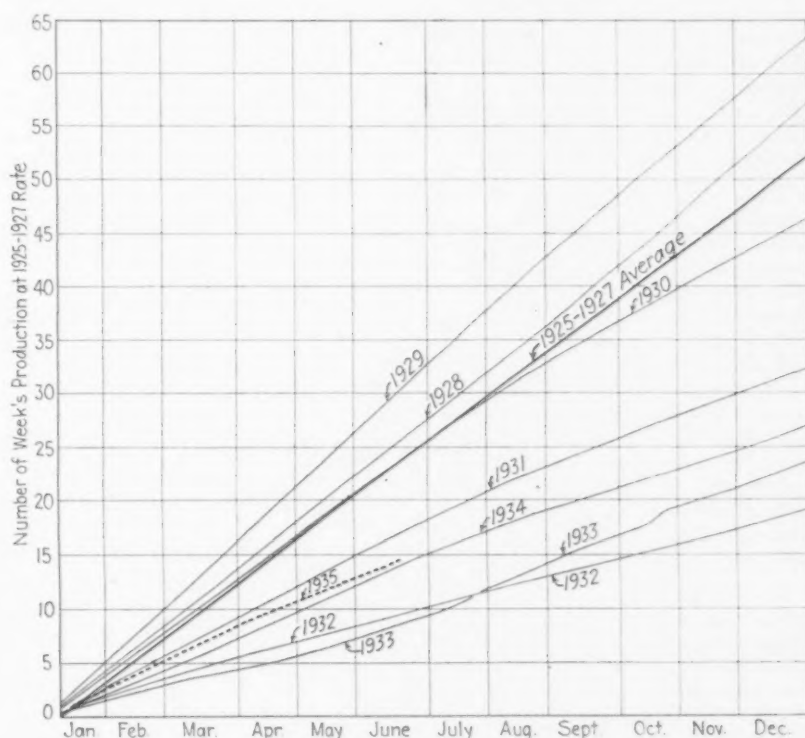
THAT a substantial potential demand for capital goods now exists is apparent from the chart shown on the opposite page, which shows THE IRON AGE Index of Capital Goods Activity plotted on a weekly cumulative basis. Each year is shown separately. The figures charted for each week of the year indicate total production for the year, up to that date, expressed in terms of the average rate of activity in the base period of 1925 to 1927.

Cumulative production at the average rate during the base period, which is shown as a diagonal straight line rising to a total of "52 weeks" in the last week of the year, provides a reasonably normal standard as a basis for comparison with subsequent years. Thus the chart shows that production of capital goods during 1928 and 1929 was continuously in substantially larger volume than in the base period. Production for 1928 exceeded the average yearly production in 1925-1927 by an amount equal to the volume produced in five weeks at the average rate of the base period, and in 1929 the excess was equivalent to ten weeks' production at the average rate during the base period. In 1930, a steady rate of production only slightly below that of the base period was maintained during the first half of the year, after which a progressive decline occurred until the trend turned sharply upward in the late spring of 1933. During 1935 the cumulative index has been running ahead of each of the three preceding

years and only slightly below 1931.

Existing shortages in capital goods can be estimated by comparing each year's production, as shown on the chart, with the aver-

vailing since that time have resulted in the accumulation of an indicated "deficiency" of capital goods which, by the end of the second week in June, amounted to



CUMULATIVE weekly production of capital goods compared by years. The rise in 1933 in the last half of the year is accounted for by the sharp recovery of business confidence following the banking moratorium.

age rate for the 1925-27 period. Thus total production in 1929 would have required 62 weeks at the average rate prevailing in 1925-27, and 1928 production was equivalent to 57 weeks. The indicated "surplus" for these two years, therefore, was equal to 15 weeks' production at the 1925-27 rate. This estimated surplus was rapidly reduced by the sharp decline commencing in 1930 and was entirely offset by the end of July, 1931. Low levels of activity pre-

the equivalent of more than two years' activity at the 1925-27 rate. In order to make good this shortage while supplying the normal needs of the country, the capital goods industries would have to operate for an entire decade at a rate of 20 per cent in excess of the average during the period from 1925 to 1927. Moreover, this estimate takes no account of the expanding needs of the population, which has increased nearly 15 per cent since 1925.

Polish Competition Lessened in Continental Markets — Ship Builders Active

HAMBURG, June 5 (*By Special Correspondence*).—Now that Poland has joined the International Wire Rod Cartel, the outlook of the cartel is regarded with great optimism. The total allotment has been increased by 30,000 tons to 360,000 tons for the third quarter of this year. Prices are now firmer, and those buyers who were surprised by the agreement with Poland and fear a further rise in prices are buying on speculation. The rise in prices was greatly welcomed by the wire industry which has complained that the wire rod industry did not cooperate with the wire industry and exports wire rods at prices below domestic quotations, thus favoring foreign competition.

The German steel industry is preparing a new export program and is anxious to raise the monthly export quantity at least to 325,000 tons for all steel products combined. The March figure was 282,000 tons; April, 293,000 tons, and April, 1934, only 197,000 tons. This will be possible, although the fresh reductions in allotments of the Continental steel industry for export is obviously against this increase in export. Barter business is excluded, and the German industry has left no doubt that it will insist upon this point.

The German steel industry is entering into prices quoted by the Belgo-Luxembourgian industry, which hitherto were always refused, and the system of quoting two prices, viz., for domestic and export consumption, has been extended also on shipment times. Whereas rather long shipment times are quoted to domestic consumers because the order books are still well filled, the shipment times for export have been reduced to meet foreign customers and are now only 12 to 18 days on bars, for example. Many orders have been turned down before because the German industry refused to accept the short times of shipment insisted upon by the foreign buyers.

It has been already reported that the Shell group has ordered three tankers by barter. A contract was booked from Mexico for three vessels and a further contract from Manchukuo for two vessels also payable in raw materials, chiefly metals and soyabeans.

Exports of barbed wire and nails to the United States, as well as

wire rope, show a good gain. During the first quarter of this year, exports of barbed wire were 2300 tons, a 100 per cent increase over 1934. Exports of other wire products were also up.

Although negotiations are still continuing and patent holders are denying it, it is very probable that after the stainless steel patents expire, very sharp competition will break out in Europe. Prices already have been twice reduced, and a number of steel plants are preparing to start production after the patents expire.

Machine Tool Demand Satisfactory

The federation of German machine tool makers reports that demand for machine tools is rather satisfactory. Export business is also improving in almost all markets. Russia, the biggest buyer up to 1932, has taken very little in 1934 and 1935, but the recent big contract will soon change this situation. It is interesting that the makers of wire machinery are having far the greatest business in the past 10 years. Many rush orders have been booked, among which, for example, is a large order for barbed wire machinery from Italy. Japan has trebled its purchases as compared with first quarter of 1934. England, the Balkans and almost all overseas markets have taken more this year. The value of business booked at the last Leipzig Fair is now estimated to be in the neighborhood of 40 million marks, of which one-third is for export.

Polish competition in the iron and steel market has virtually ended. Poland will enter the IRMA, and, since the Polish industry had been quite a formidable competitor on rails in the Latin-American and European markets, this will mean a greater stability in prices. The other agreements with Poland concern for the moment only sheets and plates, but all other products will follow.

Since the collapse of the International Tube Cartel, competition in the market for tubes has been very heavy. Prices for tubes are still declining, and the lowest figures ever paid for gas tubes have recently been reported. At the moment it is yet improbable that this

fight can be stopped in the near future.

Demand for iron and steel in Germany is still expanding and the fact that building operations are showing a further improvement assures the stability of the market. The German industry is now showing signs of a greater export activity also on such products which for a considerable time had been rather neglected, namely hoops and large plates. The German industry, which recently has paid little attention to the export trade in galvanized sheets, is now taking an active hand in this business and exports have risen from only 360 to 400 tons monthly in 1933 to over 1800 tons this year. Exports of wire rope of 1106 tons in March, 1157 tons in April were the highest in eight years.

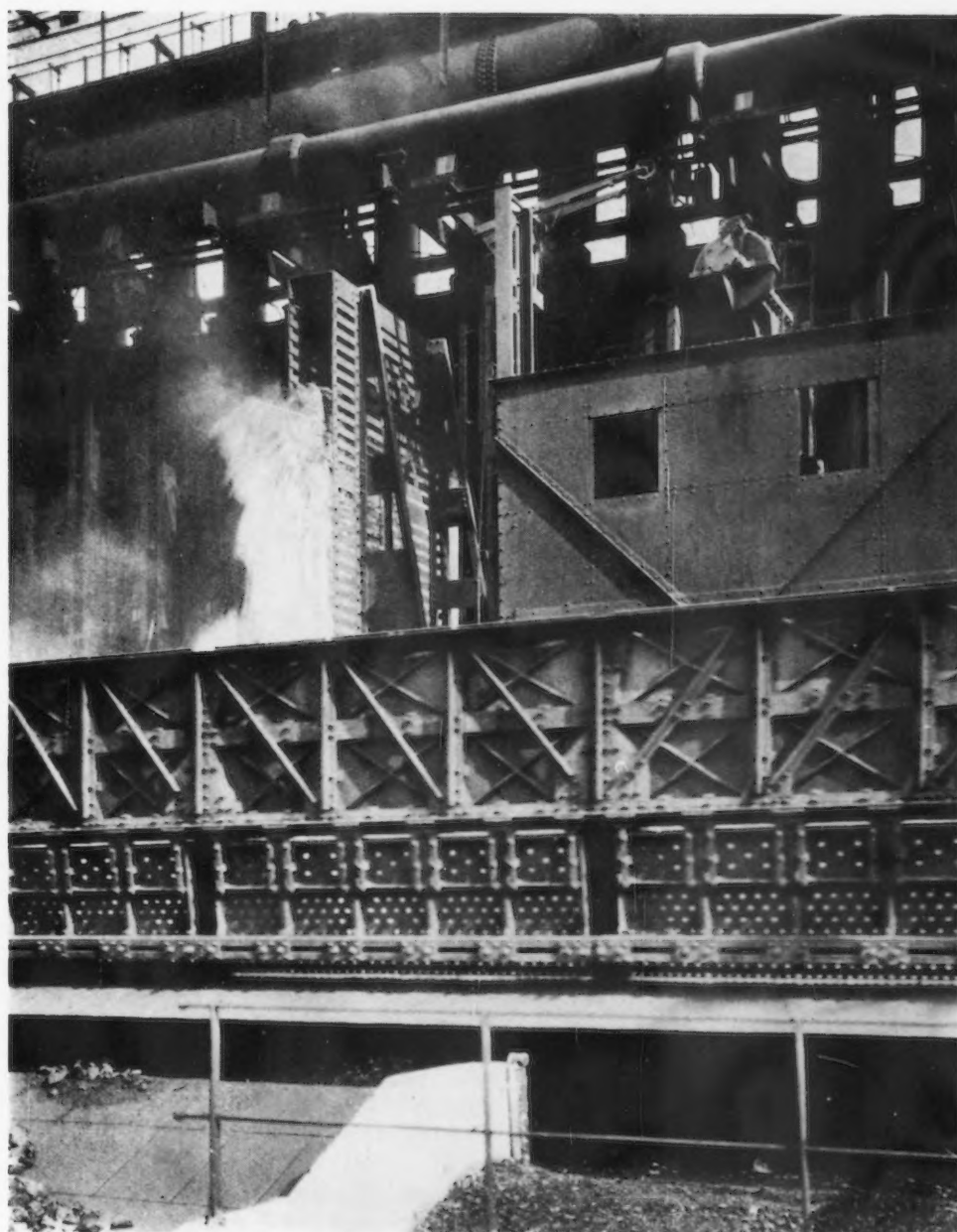
Ship construction for foreign owners is now chiefly handled by barter. In February eight tankers were ordered by the Standard Oil Co. and now the Shell oil group has ordered two tankers of 12,500 tons and one of 9500 tons from German yards payable in oil and petrol. A big German order for 65,000 tons of whale oil from Norway will be paid for by an order for three to four vessels of a total of 34,000 tons.

A fast cutting, greaseless compound, containing a coarse, sharp abrasive and used for replacing set-up wheels in the fine numbers and for cutting down, prior to buffing or coloring, is an improved product in the line of Lea compounds put out by the Lea Mfg. Co., Waterbury, Conn.

A power take-off for utilizing the power of motor trucks, in operating other industrial equipment, has been developed by Davey Compressor Co., Inc., Kent, Ohio. Power is taken from the truck drive-shaft and is controlled from the driver's cab. A sheave and V-belts are employed.

A new design steel mesh for conveyor belts, used for a wide range of industrial purposes, has been announced by Acme Steel Co., Chicago. These are built up of formed spindles of flat steel connected by pivot rods. The belts are made of either cold-rolled strip steel, galvanized or Acme stainless steel.

PLANTS AND APPARATUS for PREPARING TREATING and HANDLING GAS AND COKE and BY-PRODUCTS



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KOPPERS CONSTRUCTION CO.

KOPPERS BUILDING

PITTSBURGH, PA.

THE IRON AGE, June 20, 1935—57

Current Metal Working Activity Statistically Shown

These Data Are Assembled By THE IRON AGE From Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	May, 1935	April, 1935	May, 1934	Five Months, 1934	Five Months, 1935
Raw Materials:					
Lake ore consumption (gross tons) ^a	2,466,585	2,360,002	2,957,934	11,001,670	12,142,756
Coke production (net tons) ^b		2,736,723	3,255,069	14,538,372	
Pig Iron:					
Pig iron output—monthly (gross tons) ^c	1,727,095	1,663,475	2,042,896	7,868,180	8,246,486
Pig iron output—daily (gross tons) ^c	55,713	55,449	65,900	52,107	54,612
Castings:					
Malleable castings—production (net tons) ^d		42,035	37,165	185,701	
Malleable castings—orders (net tons) ^d		37,394	32,639	183,148	
Steel castings—production (net tons) ^d		31,952	57,313	199,216	
Steel castings—orders (net tons) ^d		28,233	46,831	232,013	
Steel Ingots:					
Steel ingot production—monthly (gross tons) ^e ..	2,602,054	2,606,311	3,352,788	13,166,381	13,615,360
Steel ingot production—daily (gross tons) ^e	96,372	100,243	124,177	101,280	104,734
Steel ingot production—per cent of capacity ^e ..	43.53	45.28	56.40	45.99	47.40
Employment in Steel Industry:					
Total employees ^f		424,623	449,362	419,207	
Total payrolls (thousands of dollars) ^g		45,890	51,896	208,934	
Average hours worked per week ^g		34.2	37.1	33.7	
Finished Steel:					
Trackwork shipments (net tons) ^h	4,228	4,472	5,764	22,463	17,365
Sheet steel sales (net tons) ⁱ		168,093	246,315	1,070,789	
Sheet steel production (net tons) ^j		209,219			
Fabricated shape orders (net tons) ^k		91,228	78,608	200,160	
Fabricated shape shipments (net tons) ^k		81,271	104,976	358,030	
Fabricated plate orders (net tons) ^k		13,244	21,891	111,438	
Reinforcing bar awards (net tons) ^k	12,080	30,490	12,035	89,570	97,770
U. S. Steel Corp'n. shipments (tons) ^h	598,915	591,728	745,063	2,693,558	2,975,891
Ohio River steel shipments (net tons) ^l		57,825	73,361	252,714	
Fabricated Products:					
Automobile production, U. S. and Canada ^k	377,754	501,837	350,616	1,475,965	1,988,637
Construction contracts, 37 Eastern States ^k	\$126,718,600	\$124,020,000	\$134,363,700	\$727,046,500	\$548,681,100
Steel barrel shipments (number) ^d		610,848	489,186	3,129,765	
Steel furniture shipments (dollars) ^d		\$1,122,987	\$1,010,528	\$4,791,172	
Steel boiler orders (sq. ft.) ^d		312,542	277,086	1,556,291	
Locomotive orders (number) ^m	2	2	17	80	13
Freight car orders (number) ^m	2	600	517	22,166	1,432
Machine tool index ⁿ	73.3	65.6	45.9	†46.8	†67.1
Foundry equipment index ^o		113.2	66.5	†69.9	
Foreign Trade:					
Total iron and steel imports (gross tons) ^p		28,886	29,465	142,780	
Imports of pig iron (gross tons) ^p		8,247	8,628	60,218	
Imports of all rolled steel (gross tons) ^p		13,566	10,063	44,162	
Total iron and steel exports (gross tons) ^p		205,336	241,753	1,033,768	
Exports of all rolled steel (gross tons) ^p		64,625	105,771	420,213	
Exports of finished steel (gross tons) ^p		54,034	69,354	365,533	
Exports of scrap (gross tons) ^p		131,731	132,725	595,733	
British Production:					
British pig iron production (gross tons) ^r	558,900	526,300	527,900	2,383,500	2,642,700
British steel ingot production (gross tons) ^r	853,300	808,700	780,000	3,749,800	4,031,200
Non-Ferrous Metals:					
Lead production (net tons) ^s		32,389	39,945	180,479	
Lead shipments (net tons) ^s		40,922	29,485	150,168	
Zinc production (net tons) ^t	34,597	35,334	30,944	158,848	175,310
Zinc shipments (net tons) ^t	35,652	38,460	35,589	159,679	185,690
Deliveries of tin (gross tons) ^v	3,950	5,825	4,110	18,600	23,775

*Preliminary. †Three Months' Average.

Sources of figures: ^a Lake Superior Iron Ore Association; ^b Bureau of Mines; ^c THE IRON AGE; ^d Bureau of the Census; ^e American Iron and Steel Institute; ^f National Association of Flat-Rolled Steel Manufacturers; ^g American Institute of Steel Construction; ^h United States Steel Corp'n.; ⁱ United States Engineer, Pittsburgh; ^j When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; ^k F. W. Dodge Corp'n.; ^l Railway Age; ^m National Machine Tool Builders Association; ⁿ Foundry Equipment Manufacturers Association; ^o Department of Commerce; ^p British Iron and Steel Federation; ^q American Bureau of Metal Statistics; ^r American Zinc Institute, Inc.; ^s New York Commodities Exchange.

SUMMARY OF THIS WEEK'S BUSINESS

Prices Gain in Stability and Consumer Hesitancy Is on the Wane

Ingot Output Undergoes Seasonal Decline to 38 Per Cent, But Demand, Especially for Nearby Needs, Shows Unexpected Vigor

IRON and steel demand continues to undergo seasonal shrinkage, and ingot output has dropped one and one-half points to 38 per cent of capacity. Declining operations, since they entail a proportionate increase in costs, have given producers an added incentive to maintain present prices. However, pressure against the price structure has not been nearly so severe as was feared when the steel code was nullified, and the propensity of buyers to postpone purchases is of diminishing importance as a market factor.

IN the Cleveland district, demand for finished steel, particularly for bars and sheets, has improved. Part of this gain is attributable to heavier orders from stove manufacturers and other miscellaneous consumers and the remainder is due to a pickup in releases from the automobile industry. Retail demand for motor cars is manifesting unexpected vigor, and July assemblies are now expected to total 300,000, as compared with a probable output of 375,000 units in June.

At Chicago, also, the business outlook is better, especially as it relates to heavy-rolled products. An inquiry for water pipe for Fort Smith, Ark., calls for 5000 tons of plates. Sizable tonnages of steel will be required for Mississippi River locks on which bids will soon be taken, and prospects are considered favorable for extensive purchases of both storage tanks and pipe lines for the Mid-Continent oil fields. Chicago mills have booked 6300 tons of rails and are still under pressure for deliveries against contracts for rails and track material needed in Western flooded areas. The Wabash Railway is in the market for 5000 tons of rails for July and August shipment, and the Missouri Pacific has obtained court authority to purchase 10,000 tons "in anticipation of a possible increase in the price of new steel rail before the close of the year."

PIG IRON buying is in larger volume, though still at close range. A Pittsburgh district pipe mill has ordered 4000 to 5000 tons of Bessemer iron. A sanitary ware company, which has just reopened two plants, has closed for 1500 tons of Southern pig iron at the prevailing market.

Structural steel awards of 25,200 tons are the third largest of the year to date and include bookings of 8500 tons for a Wabash Railway bridge at St. Charles, Mo., and 6200 tons for the superstructure of the Henry Hudson bridge, New York. New projects of 11,200 tons compare with 16,275 tons a week ago.

Plate lettings total 3610 tons, with new inquiries aggregating 16,000 tons. Prospective new business in sheet steel piling accounts for 5250 tons. Private construction work is on the increase.

Total reported awards since Jan. 1 of construction steel, including structural steel, plate work, steel piling and reinforcing, are 509,130 tons, as compared with 620,227 tons in the corresponding period in 1934.

Prospects for large purchases of steel under the \$4,000,000,000 works relief program have been darkened by Washington's announcement that most of the money to be spent will go direct to labor.

The Chesapeake & Ohio received tenders Monday against its inquiry for 5175 freight cars, but tabulation of the bids will take some time and it will be several weeks before the 65,000 tons of steel required will reach the mills.

A Cincinnati barge line has asked for figures on barges which may call for 6000 to 9000 tons of plates and shapes.

The automobile industry continues to be a conspicuous purchaser of machine tools, and prices of engine lathes and turret lathes have been advanced 8 to 15 per cent, effective immediately.

THE IRON AGE scrap index is unchanged at \$10.71 a gross ton, though prices have a weaker tone in most markets and have undergone a further general decline at Cleveland.

Fuel markets are in a state of inertia following the postponement of the bituminous coal strike until June 30. Most consumers are heavily stocked and, pending further developments, buying of coal and coke is expected to be light.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$17.84 a ton and 2.124c. a lb. respectively. Allowance of an extra 10-point discount on bolts and nuts to jobbers for carlots, first noted a week ago, has now become universal.

SO far as can be learned the steel industry has made no move to submit a voluntary code to the new skeletonized NRA. The anti-trust amendment to the new NRA act covers such an undefined area as to discourage broad trade agreements, and the doubtful advantages gained from such understandings could be easily offset by renewed labor difficulties, encouraged by administrative interpretation of the industry's obligations under Section 7-a.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous;
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934
No. 2 fdy., Philadelphia.....	\$20.3132	\$20.3132	\$20.3132	\$20.26
No. 2, Valley furnace.....	18.50	18.50	18.50	18.50
No. 2 Southern, Cin'ti.....	19.2007	19.2007	19.13	19.13
No. 2, Birmingham†.....	14.50	14.50	14.50	14.50
No. 2 foundry, Chicago*.....	18.50	18.50	18.50	18.50
Basic, del'd eastern Pa.....	19.8132	19.8132	19.8132	19.76
Basic, Valley furnace.....	18.00	18.00	18.00	18.00
Malleable, Chicago*.....	18.50	18.50	18.50	18.50
Malleable, Valley.....	18.50	18.50	18.50	18.50
L. S. charcoal, Chicago.....	24.2528	24.2528	24.2528	24.04
Ferromanganese, seab'd car- lots	\$5.00	\$5.00	\$5.00	\$5.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Finished Steel

Per Lb.:	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934
Cents	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.65
Hot-rolled annealed sheets, No. 24, Gary.....	2.50	2.50	2.50	2.75
Sheets, galv., No. 24, P'gh..	3.10	3.10	3.10	3.25
Sheets, galv., No. 24, Gary..	3.20	3.20	3.20	3.35
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	2.00
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	2.10
Wire nails, Pittsburgh.....	2.60	2.60	2.60	2.60
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.65
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.30
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., P'gh....	3.00	3.00	3.00	3.00
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	3.05
Tin plate, 100 lb. box, P'gh.	\$5.25	\$5.25	\$5.25	\$5.25

Scrap

Per Gross Ton:	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934
Heavy melting steel, P'gh ..	\$11.75	\$11.75	\$11.75	\$11.75
Heavy melting steel, Phila..	10.50	10.50	10.50	10.50
Heavy melting steel, Ch'go..	9.87 1/2	9.87 1/2	10.00	9.75
Carwheels, Chicago.....	10.50	10.50	10.50	9.75
Carwheels, Philadelphia ..	11.25	11.25	11.25	12.50
No. 1 cast, Pittsburgh.....	13.25	13.25	12.75	12.25
No. 1 cast, Philadelphia.....	11.25	11.25	11.25	12.25
No. 1 cast, Ch'go (net ton)..	9.00	9.00	9.00	7.50
No. 1 RR. wrot., Phila.....	10.25	10.25	10.25	12.25
No. 1 RR. wrot., Ch'go (net)	7.75	7.75	8.00	7.50

Rails, Billets, etc.

Per Gross Ton:	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934
Rails, heavy, at mill	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2
Light rails, Pittsburgh.....	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh.	27.00	27.00	27.00	29.00
Sheet bars, Pittsburgh.....	28.00	28.00	28.00	30.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	29.00
Forging billets, Pittsburgh..	32.00	32.00	32.00	34.00
Wire rods, Pittsburgh.....	38.00	38.00	38.00	38.00
	Cents	Cents	Cents	Cents
Skelp. grvd. steel, P'gh, lb ..	1.70	1.70	1.70	1.70

Coke, Connellsville

Per Net Ton at Oven:	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934
Furnace coke, prompt.....	\$3.50	\$3.50	\$3.85	\$3.85
Foundry coke, prompt.....	4.00	4.00	4.60	4.60

Metals

Per Lb. to Large Buyers:	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934
Cents	Cents	Cents	Cents	Cents
Electrolytic copper, refinery..	8.75	8.75	8.75	8.75
Lake copper, New York.....	9.12 1/2	9.12 1/2	9.12 1/2	9.12 1/2
Tin (Straits), New York.....	51.00	50.50	51.35	51.25
Zinc, East St. Louis.....	4.30	4.25	4.25	4.20
Zinc, New York.....	4.67 1/2	4.62 1/2	4.62 1/2	4.55
Lead, St. Louis.....	3.85	3.85	3.95	3.85
Lead, New York.....	4.00	4.00	4.10	4.00
Antimony (Asiatic), N. Y..	12.75	12.75	14.25	7.90

Finished Steel

Per Lb.:	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934
Cents	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.90
Bars, Chicago.....	1.85	1.85	1.85	1.95
Bars, Cleveland.....	1.85	1.85	1.85	1.95
Bars, New York.....	2.15	2.15	2.15	2.23
Plates, Pittsburgh.....	1.80	1.80	1.80	1.85
Plates, Chicago.....	1.85	1.85	1.85	1.90
Plates, New York.....	2.09	2.09	2.09	2.13
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.85
Structural shapes, Chicago..	1.85	1.85	1.85	1.90
Structural shapes, New York..	2.06 1/4	2.06 1/4	2.06 1/4	2.10 1/4
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh.	1.85	1.85	1.85	2.00
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.80

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

June 18, 1935	2.124c. a Lb.
One week ago	2.124c.
One month ago	2.124c.
One year ago	2.199c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

Pig Iron

\$17.84 a Gross Ton
17.84
17.83
17.90

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap

\$10.71 a Gross Ton
10.71
10.75
10.67

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW		HIGH	LOW		HIGH	LOW
1935	2.124c., Jan. 3;	2.124c., Jan. 8	\$17.90, Jan. 8;	\$17.83, May 14	\$12.33, Jan. 8;	\$10.33, April 23	13.00, Mar. 13;	9.50, Sept. 25
1934	2.199c., April 24;	2.008c., Jan. 2	17.90, May 1;	16.90, Jan. 27	12.25, Aug. 8;	6.75, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1933	2.015c., Oct. 3;	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	8.50, Jan. 12;	6.43, July 5	8.50, Jan. 12;	6.43, July 5
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	11.33, Jan. 6;	8.50, Dec. 29	11.33, Jan. 6;	8.50, Dec. 29
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	15.00, Feb. 18;	11.25, Dec. 9	15.00, Feb. 18;	11.25, Dec. 9
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	17.58, Jan. 29;	14.08, Dec. 3	17.58, Jan. 29;	14.08, Dec. 3
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	16.50, Dec. 31;	13.08, July 2	16.50, Dec. 31;	13.08, July 2
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	15.25, Jan. 11;	13.08, Nov. 22	15.25, Jan. 11;	13.08, Nov. 22
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1				

Seasonal Letdown in Demand at Pittsburgh



Production Is Receding, and Rising Costs Discourage Price Concessions—Scrap Market Remains Unchanged

PITTSBURGH, June 18.—Raw steel production in the Pittsburgh area is down one point this week to 34 per cent of capacity. Curtailment of nearly all open-hearths at one small independent mill was offset by the resumption today of a limited schedule at another small independent mill. The leading producer has scaled down production moderately, while other mills are sustaining recent output. In the Valleys and nearby northern Ohio mills open-hearth operations are unchanged at 42 per cent, while in the Wheeling district production is holding at 45 per cent.

Pittsburgh steel makers are beginning to feel the effects of seasonal declines in finished steel demand. The largest tonnage loss is in automotive grades. Occasional spurts in buying by miscellaneous consumers are engendering hope that the usual summer decline in aggregate demand will not be severe. Backing up this growing belief is the low point of finished steel inventories estimated to be in consumers' hands. The deferment of the bituminous coal strike has not visibly affected steel markets here, but the uncertainty of the outcome of present issues is unquestionably an underlying cause for concern.

With operations pointing downward for the early summer weeks and production costs headed proportionately higher, there will be every incentive to maintain current steel prices. Third quarter requirements have been practically untouched.

Sheet mill operations probably will hold at around 50 per cent this week, while hot-rolled strip production is off at 30 per cent, and cold-rolled strip, at 35 per cent. Tin plate mill operations have receded further, with this week's schedules at 65 to 70 per cent.

Pig Iron

In a more or less closed transaction a pipe mill in the Pittsburgh district purchased 4000 to 5000 tons of Bessemer pig iron from a lead-

ing independent steel mill. The Standard Sanitary Mfg. Co. has reopened its Pittsburgh plant. Small-lot demand continues to be the general rule in this market. Uncertainty as to price trends has largely disappeared, and producers in this district are united in maintaining the present price structure.

Semi-Finished Steel

Scattered contracts for third quarter tonnage have been negotiated, but purchases by non-integrated mills continue chiefly on a spot basis. Demand for sheet bars for tin plate conversion is rather sporadic. Sheet bars also are being adversely affected by continued recession in sheet mill output. Movement of wire rods, though not heavy, is encouragingly steady. Skelp is in fair demand. Automobile shops are taking forging stock in lesser quantities. It appears unlikely that any preferential prices on semi-finished grades are in the wind, and present indications point only to a strong price position.

Bolts, Nuts and Rivets

Miscellaneous specifications received by some producers spurred in the past week, but business generally is sluggish. Few third quarter contracts have been closed thus far. The firm attitude of steel producers on prices is being reflected in the nut and bolt industry, which is endeavoring to mop up certain weak spots where price concessions have persisted. The fact that the industry will not be able to buy its steel any cheaper, regardless of the passing of codes, is expected to serve as a stabilizing influence in the general price structure.

Reinforcing Steel

The Allegheny County Authority has rejected the bid of John F. Casey Co., Pittsburgh, of \$1,157,635 for construction of the Liberty tubes tolls plaza, which would entail a substantial tonnage of steel. Only two bids were submitted and the low bid would have left an insufficient amount to cover land con-

demnation. The only other bidder was the Dravo Contracting Co., Pittsburgh. Calls for new bids have not been issued. General demand for reinforcing steel is tending upward, but with the large Federal works relief program held in partial abeyance important volume is not coming through. Increased use of steel in private home building is a minor benefit to current demand. The market appears to be free from price irregularities.

Cold-Finished Bars

June bookings and shipments at the half-way mark are practically equal to those in the first half of May. This record is encouraging in the face of measurable loss in automotive tonnage. Miscellaneous business is the prominent support in the current market. Jobbing business, which declined after the Supreme Court's code decision, is slightly improved. Cold-finished bar producers report a surprising lack of pressure for preferential prices. The cold-finished industry is operating at around 22 per cent.

Plates and Shapes

The Mississippi Valley Barge Lines Co., Cincinnati, has requested bids by July 1 on an indeterminate number of barges, 200 ft. long by 35 ft. wide. It is believed that 20 or 30 barges will be purchased, involving 6000 to 9000 tons of plates and shapes. Several other important barge inquiries are pending, and contracts are believed ready to be placed within a week or two. Other outlets for plates are somewhat narrow. A substantial amount of tank work will soon be specified by the American Oil Co. for its Hays, Pa., terminal, but little other new work is in early prospect.

Deferment of allocations on the Federal works relief program is depressing the structural market, which is kept alive by scattered public and private projects. Awards reported here for the past week included 800 tons to Jones & Laughlin Steel Corp. for the Fisher Body Corp. storage building at Pontiac, Mich.

Sheet Steel Piling

New specifications in the past week were few and unimportant from a tonnage standpoint. Any evidence of price cutting points to used material and not to primary piling, which is being held at the present Pittsburgh base of 2.15c. a lb.

Tubular Products

Volume of new business reflects little fluctuation from week to week. Demand for oil-country goods continues in fairly satisfactory vol-

ume, while spot shipments of standard pipe, commercial boiler tubes and mechanical tubing are adding a fair share to the aggregate movement. Increased home building is drawing standard pipe more freely from warehouse stocks.

Bars

Further shrinkage in automobile tonnage in the past week was more than offset by a generous flow of miscellaneous orders. Comparisons of June tonnage with May business bring a fair measure of satisfaction to producers, who had not expected a sustained aggregate volume in the face of reduced movement to the automotive industry. Talk of lower prices has largely disappeared. Producers frankly admit that cancellations and deferments on contracts had been expected after the NIRA's death, but no important interruptions or cancellations have ensued. This behavior is taken as a clear indication of the healthy relationship between demand and hot-rolled bar production since the early part of this year.

Wire Products

No check to the downtrend in demand has appeared, although the recession has been moderated by seasonal interest in wire fencing. A substantial tonnage of wire mesh is in the making for road construction, which this year has been delayed by deferred releases of money from the huge Federal relief works program. Merchant trade is notably apathetic, with wire nails moving in small quantities. Demand for bolt wire is slack.

Sheets

With talk of prices subsiding, the flow of miscellaneous small orders has been accelerated and consequently has regained some volume lost through lessening automotive demand. Although aggregate movement is slightly lower, the drop this week will not materially affect output, which will hold at around 50 per cent.

Tin Plate

Operations are spotty, with some units largely suspended owing to heavy warehouse stocks. Crop reports are exceptionally favorable, and warehouse stocks are considered likely to be depleted for early packs within the next several weeks. Operations continue to recede, with this week's schedules estimated at 65 to 70 per cent.

The expansion in tin plate demand expected to materialize from the sale of beer in cans probably will be slow to appear. Preliminary surveys of potential markets for this new use for tin plate place an-

nual requirements at about 2,000,000 boxes, or 100,000 tons. These estimates do not take into consideration the export markets. Before potential domestic markets for this purpose can be fully developed, the use of a lighter tin plate probably will be necessary in order to effect a saving to the ultimate consumer. Heavy capital expenditures essential to major development of these markets by can companies and brewers are dictating extreme caution in surveying the possibilities of this new container idea.

Strip Steel

The pace of operations has slackened further, with hot-rolled production estimated at 30 per cent, and cold-rolled output at 35 per cent. The drop is traceable directly to notably lighter demand from the automotive industry, and a diminution in miscellaneous buying. The question of prices seems to have lost importance in the past week, and there is little or no pressure from any source for lower quotations.

Coke and Coal

Postponement of the bituminous strike until June 30 has temporarily, at least, placed fuel markets in a state of inertia. Neither producers nor consumers at the present writing are able to predict with any certainty the outcome of the present issues. Until further developments appear, buying of coal and coke is expected to be at a minimum. The Guffey bill evidently is the focal point at which the mine union is aiming, and in the event of its early passage only temporary relief from present labor agitation is expected. The Southern operators are believed ready to immediately file an injunction against the bill's legality if it is passed. In the meantime, extremely heavy shipments of fuel since the threatened strike on April 1 have placed most consumers in a comfortable stock position, and pressure for additional shipments has been almost entirely relaxed for the time being. Prices, in the absence of significant buying, are nominal.

Scrap

Activity has dwindled to minor dealer transactions. Mills in this district are not manifesting any interest in covering, and it is considered unlikely in the face of the season in the steel business that any active buying will appear during the remainder of June. Some mills are liquidating stocks in order to show low inventories at the end of the first half. Scrap quotations have remained practically stationary for the past week and are largely nominal. Little short interest is in evidence, and lack of

pressure both on the part of dealers and consumers is momentarily forestalling a definite market trend.

Reinforcing Steel

Awards 3150 Tons—New Projects
Over 10,000 Tons

AWARDS

Commonwealth of Massachusetts, 800 tons, Quabbin reservoir, to Concrete Steel Co.

Hastings, N. Y., 100 tons, sewer, to Truscon Steel Co.

Flushing, N. Y., 440 tons, incinerator, to Joseph T. Ryerson & Son, Inc.

Will County, Ill., 600 tons, bridge, to O. J. Dean & Co.

Lake Forest, Ill., 100 tons, sewage plant, to an unnamed bidder.

Los Angeles, 233 tons, Miramonte school, to Soule Steel Co.

Long Beach, Cal., 103 tons, units A and B at John Dewey school, to Blue Diamond Corp.

Hollywood, Cal., 126 tons, post office, to Soule Steel Co.

Los Angeles, 108 tons, Los Angeles Junior College building, to Soule Steel Co.

Huntington Park, Cal., 168 tons, high school, to Security Materials Co.

State of California, 135 tons, highway work in Orange and San Bernardino Counties, to unnamed bidders.

Salem, Ore., 210 tons, warehouse, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

Queens and Erie Counties, N. Y., 550 tons, mesh for highways; bids by July 2.

Detroit, 900 tons, parcel post building; Joseph Holpuck, Chicago, low bidder.

Kansas City, Kan., 1000 tons, high school building; N. P. Severin Co., Chicago, general contractor.

North Shore Railway, Chicago, tonnage being estimated, six overhead crossings.

Chicago, 700 tons, Contract No. 1 for Sanitary District.

Red Wing, Minn., 750 tons, locks on Mississippi River.

Clinton, Iowa, 600 tons, locks on Mississippi River.

Casper, Wyo., 1100 tons, Alcova dam for Bureau of Reclamation; bids July 15.

Rawlins, Wyo., 2650 tons metal work, Seminoe dam on Alcova Project; bids soon.

Fresno, Cal., 460 tons, city auditorium; bids July 11.

Bonneville Dam, Ore., 1350 tons, fishways.

Chelan County, Wash., 125 tons, State bridge over Toutle River; bids soon.

Yarnall-Waring Co., Chestnut Hill, Philadelphia, announces a new forged steel tandem blow-off valve unit made for 600 and 1500 lb. pressures. The sealing valve is of Yarway seatless design. The blowing valve is of new construction. A one-piece forged steel billet serves as the common body.

Chicago Output Off Three Points to 39½ Per Cent



CHICAGO, June 18.—A greater degree of spottiness characterizes this market, and ingot output has dropped three points to 39½ per cent of capacity.

New specifications for finished steel are moderately heavier and sellers are inclined to believe that resistance to lower operations is at hand. It is rather strange to find bars in lighter demand after this commodity has been the leader for months. Nevertheless this is the situation at a time when demands for most other steel mill commodities are making a better showing. Orders for plates are heavier, and the outlook for additional new business is improved to the point where it is expected that the Mid-Continent oil fields will enter the market for storage tanks and pipe lines. Automobile plants are taking smaller quantities of bars, but they are increasing sheet specifications, with the result that Chicago mills will operate over the week-end. Structural awards and inquiries are making a better showing, and shops are again starting to figure on Mississippi River locks. Inquiries are expected soon for railroad and highway bridges that have been taken out by floods. Emergency rails and track accessories are still being rushed to flood-stricken areas.

Scrap remains weak and dull. The Sky-Ride, a feature of the Century of Progress, has been wrecked and the 3000 tons will be offered as No. 1 heavy melting steel.

Pig Iron

Shipments are smaller because of curtailment of output by automotive foundries. The drop in that direction is partly offset by heavier releases from tractor plants. Stove and furnace plants continue to operate above seasonal expectations, which is a reflection of improved residential construction.

Coke

Shipments are climbing as many consumers take measures of protection against a possible strike in the coal industry. Coke producers are assuring the trade that ovens are amply protected by coal supplies,

Business Is Spotty But Promises Increasing Resistance to Further Curtailment of Operations—Plate Demand Improves

which will assure adequate coke under any conditions. Prices are steady at \$8.50 a ton, local ovens, for delivery outside the Chicago switching district.

Rails

Rail orders for 7500 tons have been placed, of which 6300 tons have been added to Chicago mill books. Several weeks ago sellers estimated that probably 15,000 tons remained to be purchased on this year's program. However, they are revising their estimate, which, they say, despite the above purchase, is still at least 15,000 tons and may run as high as 30,000 tons. There is still pressure for quick releases against old contracts for rails needed in flooded areas. New business in track accessories totals 4000 tons, part of which is emergency tonnage for quick movement to flooded districts.

Sheets

Output stands in the range of 55 to 60 per cent, and a significant thing is that releases from automobile centers are sufficiently heavier to permit more uniform operations, which will carry over the week-end. In recent weeks mills have been forced to bunch orders and week-end shut-downs have been the rule. Miscellaneous demand remains quite stable and is one of the best features of the local sheet market.

Plates

There is promise of considerable improvement in the plate market. Fort Smith, Ark., is in the market for 5000 tons of water pipe, and 350 tons has been ordered by Fort Morgan, Colo. Plates will be needed for the Clinton, Iowa, locks, on which bids will soon be taken, and plans will soon be out for locks at Red Wing, Minn., another of the Mississippi River developments. A scow has been ordered at Grand Haven, Mich., and 600 tons of dredge pipe is being sought for Fort Peck, Mont. The entire plate situation looks much improved, especially when it is con-

sidered that reports from the Mid-Continent oil fields indicate that inquiries for both storage tanks and pipe lines may soon come from that area.

Wire Products

A moderate recession in output is noted, but this is due more to the great variety of products being sought in small quantities rather than to any marked lessening in demand. Fall terms on woven wire fencing have proved ineffectual, and all purchases remain on a day-to-day basis. Concrete reinforcing mesh is very slow for this time of year, and the reason is that Federal aid money is not yet available. A significant development is that the drop in business so far in June has been at a slower rate than a year ago.

Cold Rolled Strip

Output ranges from 35 to 40 per cent of capacity and it is largely supported by demand from miscellaneous consumers. Prices remain steady.

Cold-Drawn Bars

This commodity is experiencing its usual summer slump. Orders are small and they are highly variable.

Bars

General specifications for bar mill products, contrary to the trend of this week's market, are lower. As is characteristic of the entire picture, the miscellaneous trade is holding, but large users, with the exception of farm implement manufacturers and road machinery builders, are slackening their pace. There is, however, a strong possibility that automobile plants will be forced into the market again before the end of the month.

Structural Material

This market is making a very much better showing, with awards at 5500 tons and fresh inquiries of more than 4000 tons. Two developments on the Mississippi River are taking shape and others will follow during the remainder of the summer and in the fall months. Some private work is again in evidence.

Reinforcing Bars

There is a tendency for prices to waver on large tonnages but quotations are holding on all small jobs. The week has not been eventful except for an order for a 600-ton highway bridge in Will County, Ill., and a 700-ton inquiry by the Sanitary District, Chicago. The general contract on the 1000-ton

Kansas City high school has been let, but the bars may not be ordered for some time. It is reported that Federal aid is taking a form whereby little money will be available for materials. In Wisconsin it is planned to grade and do work preparatory to paving at a later date. This plan will throw most of the available money into direct labor.

Cast Iron Pipe

Demand for new tonnages has dropped almost to the vanishing point. Particularly disappointing to sellers is the absence of inquiries from industrial plants, which late in the spring displayed a disposition to buy. Shipments are in fair volume but are limited not so much by the size of order books as by red tape that has tied many Government aid jobs in a knot. Prices are stable.

Scrap

Both buyers and sellers are marking time in a market that has all the earmarks of a summer lull. Dealers are fortified with old orders against which they are placing incoming scrap and in that way are pushing to one side the threat of distress cars. Mills are accepting scrap in excess of requirements and are again adding to stocks. Turnings are finding a ready market near Chicago but borings are being stored at a local dock for water shipment to the East.

Business Hesitant On Coast

SAN FRANCISCO, June 17.—Activity on the Pacific Coast has been checked as many lettings are held in abeyance. Awards in the San Francisco area have been practically light, but a number of small lettings of schools have been reported in the Los Angeles district. With the exception of Federal dam work, little activity is noted in the Northwest. Uncertainty as to the trend of prices may be largely responsible for current procrastination.

The Los Angeles County Sanitation District will take bids July 2 on the White Point outfall sewer. Approximately 2450 tons of reinforcing bars, 750 tons of structural steel and 5780 ft. of 60-in. reinforced concrete or cast iron pipe are involved in the two contracts advertised.

The Bureau of Reclamation has completed plans for the Alcova and Seminole dams to be constructed near Casper and Rawlins,

Wyo., respectively. The Alcova Dam, on which bids will be opened July 15 at Casper, Wyo., will require 1100 tons of bars and 877 tons of structural and miscellaneous steel. The construction of the second dam will involve 2650 tons of steel. The bureau has also completed plans for fishways at Bonneville Dam, near Portland, Ore., which will require 1350 tons of reinforcing bars and 160 tons of structural steel.

Reinforcing bar awards reported during the past were principally in southern California. Of the total lettings of 1246 tons, Soule Steel Co. took 677 tons on four projects. Structural bookings were at a minimum as were cast iron pipe and plates. Although activity has been slowed down it is the belief of many that, after the "fear period" is over and public works get under way, business will show marked increases over the first and second quarters.

Exports Sustain Boston Scrap Prices

BOSTON, June 18.—The market for bundled skeleton is somewhat easier, but scrap prices otherwise are holding up well because of continued active buying for export. A steamer with 2559 tons of scrap left here in the past week for Poland, and another is loading 3000 to 4000 tons for a European port. A steamer is due here June 22 to load for Japan. Local exports in first half of June were about 13,500 tons. Having loaded two boats at Providence, R. I., exporters are preparing to load a third. The Weirton Steel Co. has held up purchases of steel turnings; consequently the Pittsburgh district market so far as shipments from this area are concerned is duller than ever. A broker is bidding \$10.50 to \$11 a ton, delivered eastern Pennsylvania, for heavy breakable cast, but is obtaining almost no material.

Current pig iron sales consist of small tonnages, mostly for prompt delivery. Prices are holding, however. The New England melt is decreasing rather than increasing, but a turn for the better is anticipated now that the new NRA act has passed.

By-product coke makers on July 1 will raise prices on domestic sizes. The extent of the advance is to be announced this week. No change is expected in the price of foundry coke, however.

Pipe Lines

Lone Star Gas Co., Dallas, Tex., plans 20-in. welded steel pipe line from natural gas fields at Long Lake and Cayuga, Anderson County, Tex., to Irving, near Dallas, about 110 miles, where connection will be made with present steel pipe line for increased natural gas supply. Cost over \$2,000,000. L. B. Denning is president.

Petroleum Transportation Co., Merchants Building, Alma, Mich., recently formed as an interest of Michigan Exploration Co., Muskegon, Mich., plans welded steel pipe line from Montcalm-Mecosta natural gas fields to point near Bloomfield, Mich., about 25 miles, where connection will be made with main trunk lines of Consumers Power Co., Jackson, Mich., for increased natural gas supply. A steel pipe line gathering system will be installed in gas fields noted. Entire project will cost about \$200,000.

Vermillion Natural Gas Co., Vermillion, S. D., recently organized, care of E. A. Lenhart, city auditor, has been granted franchise for local gas supply and plans construction of welded steel pipe line to point about 11 miles distant where source of supply is located; steel pipe lines for distribution in municipality also will be installed. Cost over \$85,000.

Board of Supervisors of Tulare County, Visalia, Cal., has called special election July 10 for formation of new municipal gas utility district for cities of Tulare, Corcoran and Lindsay. Similar election, recently held, included Porterville in proposed district and resulted in defeat of issue, due to vote in last noted city, now being omitted in new election. Work will comprise 54 miles of steel pipe, 2, 4 and 6-in., for three communities noted, to cost \$260,850 including distribution lines in municipalities. Charles F. Burr, mayor of Lindsay, is active in project. H. L. Hinkel is engineer.

Mid-West Pipe Line Co., Murray Building, Grand Rapids, Mich., Benjamin J. Skinner, head, recently organized as an interest of Mid-West Refining Co., Alma, Mich., plans construction of welded steel pipe line from Crystal oil field district, Montcalm County, to Alma, about 13 miles, for crude oil supply for refinery of Mid-West company at that place. Cost over \$50,000.

Wilshire Oil Co., Santa Fe Springs, Cal., has awarded general contract for a steel pipe line requiring 300 tons.

Scattered Reductions in Scrap at Detroit

DETROIT, June 18.—There has been little activity in the local scrap market. Steel mills have plenty of old material on hand and probably will not be making fresh purchases for several weeks. A few items have dropped 25c. a ton, but the market generally is at about the same level as a week ago. Producers of scrap are demanding fairly good prices, preferring to keep their holdings rather than sell them at less than what they believe they are worth.

Bureau of Yards and Docks, Navy Department, has awarded a \$55,905 contract to Shepard-Niles Crane & Hoist Corp., Philadelphia, for cranes for Norfolk, Va., Navy Yard.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Duluth	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Buffalo	1.90c.
F.o.b. Philadelphia	2.11c.
F.o.b. New York	2.10c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.85c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
F.o.b. Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	2.00c.
F.o.b. Gary	2.00c.
F.o.b. Cleveland	2.00c.
F.o.b. Buffalo	2.05c.
Del'd Detroit	2.15c.
Del'd eastern Michigan	2.20c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

	Base per Net Ton
F.o.b. Pittsburgh	\$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.95c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.99c.
Del'd New York	2.09c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh.	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80
F.o.b. Chicago	1.85
F.o.b. Cleveland	1.95
F.o.b. Buffalo	1.90
F.o.b. Bethlehem	1.90
F.o.b. Philadelphia	2.015
F.o.b. New York	2.0625
F.o.b. Birmingham (standard)	1.95
F.o.b. cars dock Gulf ports	2.20
F.o.b. cars dock Pacific ports	2.35

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports.....	2.60c.
F.o.b. cars dock Pacific ports.....	2.60c.

SHEETS, STRIP, TIN PLATE

TERNE PLATE

Sheets

Hot Rolled	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.10c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.71c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.81c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.26c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 24, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.41c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. Gary	3.50c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.
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Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock Pacific Coast ports	3.35c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mill	\$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)	
8-lb. coating I.C.	.....\$10.00
15-lb. coating I.C.	.....12.00
20-lb. coating I.C.	.....13.00
25-lb. coating I.C.	.....14.00
30-lb. coating I.C.	.....15.25
40-lb. coating I.C.	.....17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

and Flats under ¼ In.	
	Base per
All widths up to 24 in., P'gh.....	1.85
All widths up to 24 in., Chicago.....	1.95
All widths up to 24 in., del'd De- troit	2.05
All widths up to 24 in., Birmingham.....	2.00
Cooperage stock, Pittsburgh.....	2.10
Cooperage stock, Chicago	2.20

Cold-Rolled Strips

	Base per L.
F.o.b. Pittsburgh	2.60
F.o.b. Cleveland	2.60
Del'd Chicago	2.85
F.o.b. Worcester	2.80

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per L
F.o.b. Pittsburgh	1.70
F.o.b. Chicago	1.75
F.o.b. Birmingham	1.85

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	Per Lb.
Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are \$2 a ton above, Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails	\$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

	Base per 100 Lb.
Annealed fence wire	\$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column.....	63.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh; Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are \$6 a ton over Pittsburgh, while Pacific Coast prices are \$8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are \$11 a ton above Pittsburgh. On staples and barbed wire, prices of \$6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

	Off List
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

F.o.b. Pittsburgh only on wrought iron pipe

Butt Weld			
Steel		Wrought Iron	
Inches	Black Galv.	Inches	Black Galv.
1/4	51 1/2	29 1/2	51 1/2 + 13 1/2
3/4	53 1/2	35 1/2	53 1/2 + 13 1/2
1	55 1/2	41 1/2	55 1/2 + 13 1/2
1 1/4	57 1/2	47 1/2	57 1/2 + 13 1/2
1 3/4	59 1/2	53 1/2	59 1/2 + 13 1/2
2	61 1/2	59 1/2	61 1/2 + 13 1/2
2 1/4	63 1/2	65 1/2	63 1/2 + 13 1/2
2 3/4	65 1/2	71 1/2	65 1/2 + 13 1/2
3	67 1/2	77 1/2	67 1/2 + 13 1/2
3 1/4	69 1/2	83 1/2	69 1/2 + 13 1/2
3 1/2	71 1/2	89 1/2	71 1/2 + 13 1/2
3 3/4	73 1/2	95 1/2	73 1/2 + 13 1/2
4	75 1/2	101 1/2	75 1/2 + 13 1/2
4 1/4	77 1/2	107 1/2	77 1/2 + 13 1/2
4 1/2	79 1/2	113 1/2	79 1/2 + 13 1/2
4 3/4	81 1/2	119 1/2	81 1/2 + 13 1/2
5	83 1/2	125 1/2	83 1/2 + 13 1/2
5 1/4	85 1/2	131 1/2	85 1/2 + 13 1/2
5 1/2	87 1/2	137 1/2	87 1/2 + 13 1/2
5 3/4	89 1/2	143 1/2	89 1/2 + 13 1/2
6	91 1/2	149 1/2	91 1/2 + 13 1/2
6 1/4	93 1/2	155 1/2	93 1/2 + 13 1/2
6 1/2	95 1/2	161 1/2	95 1/2 + 13 1/2
6 3/4	97 1/2	167 1/2	97 1/2 + 13 1/2
7	99 1/2	173 1/2	99 1/2 + 13 1/2
7 1/4	101 1/2	179 1/2	101 1/2 + 13 1/2
7 1/2	103 1/2	185 1/2	103 1/2 + 13 1/2
7 3/4	105 1/2	191 1/2	105 1/2 + 13 1/2
8	107 1/2	197 1/2	107 1/2 + 13 1/2
8 1/4	109 1/2	203 1/2	109 1/2 + 13 1/2
8 1/2	111 1/2	209 1/2	111 1/2 + 13 1/2
8 3/4	113 1/2	215 1/2	113 1/2 + 13 1/2
9	115 1/2	221 1/2	115 1/2 + 13 1/2
9 1/4	117 1/2	227 1/2	117 1/2 + 13 1/2
9 1/2	119 1/2	233 1/2	119 1/2 + 13 1/2
9 3/4	121 1/2	239 1/2	121 1/2 + 13 1/2
10	123 1/2	245 1/2	123 1/2 + 13 1/2
10 1/4	125 1/2	251 1/2	125 1/2 + 13 1/2
10 1/2	127 1/2	257 1/2	127 1/2 + 13 1/2
10 3/4	129 1/2	263 1/2	129 1/2 + 13 1/2
11	131 1/2	269 1/2	131 1/2 + 13 1/2
11 1/4	133 1/2	275 1/2	133 1/2 + 13 1/2
11 1/2	135 1/2	281 1/2	135 1/2 + 13 1/2
11 3/4	137 1/2	287 1/2	137 1/2 + 13 1/2
12	139 1/2	293 1/2	139 1/2 + 13 1/2
12 1/4	141 1/2	299 1/2	141 1/2 + 13 1/2
12 1/2	143 1/2	305 1/2	143 1/2 + 13 1/2
12 3/4	145 1/2	311 1/2	145 1/2 + 13 1/2
13	147 1/2	317 1/2	147 1/2 + 13 1/2
13 1/4	149 1/2	323 1/2	149 1/2 + 13 1/2
13 1/2	151 1/2	329 1/2	151 1/2 + 13 1/2
13 3/4	153 1/2	335 1/2	153 1/2 + 13 1/2
14	155 1/2	341 1/2	155 1/2 + 13 1/2
14 1/4	157 1/2	347 1/2	157 1/2 + 13 1/2
14 1/2	159 1/2	353 1/2	159 1/2 + 13 1/2
14 3/4	161 1/2	359 1/2	161 1/2 + 13 1/2
15	163 1/2	365 1/2	163 1/2 + 13 1/2
15 1/4	165 1/2	371 1/2	165 1/2 + 13 1/2
15 1/2	167 1/2	377 1/2	167 1/2 + 13 1/2
15 3/4	169 1/2	383 1/2	169 1/2 + 13 1/2
16	171 1/2	389 1/2	171 1/2 + 13 1/2
16 1/4	173 1/2	395 1/2	173 1/2 + 13 1/2
16 1/2	175 1/2	401 1/2	175 1/2 + 13 1/2
16 3/4	177 1/2	407 1/2	177 1/2 + 13 1/2
17	179 1/2	413 1/2	179 1/2 + 13 1/2
17 1/4	181 1/2	419 1/2	181 1/2 + 13 1/2
17 1/2	183 1/2	425 1/2	183 1/2 + 13 1/2
17 3/4	185 1/2	431 1/2	185 1/2 + 13 1/2
18	187 1/2	437 1/2	187 1/2 + 13 1/2
18 1/4	189 1/2	443 1/2	189 1/2 + 13 1/2
18 1/2	191 1/2	449 1/2	191 1/2 + 13 1/2
18 3/4	193 1/2	455 1/2	193 1/2 + 13 1/2
19	195 1/2	461 1/2	195 1/2 + 13 1/2
19 1/4	197 1/2	467 1/2	197 1/2 + 13 1/2
19 1/2	199 1/2	473 1/2	199 1/2 + 13 1/2
19 3/4	201 1/2	479 1/2	201 1/2 + 13 1/2
20	203 1/2	485 1/2	203 1/2 + 13 1/2
20 1/4	205 1/2	491 1/2	205 1/2 + 13 1/2
20 1/2	207 1/2	497 1/2	207 1/2 + 13 1/2
20 3/4	209 1/2	503 1/2	209 1/2 + 13 1/2
21	211 1/2	509 1/2	211 1/2 + 13 1/2
21 1/4	213 1/2	515 1/2	213 1/2 + 13 1/2
21 1/2	215 1/2	521 1/2	215 1/2 + 13 1/2
21 3/4	217 1/2	527 1/2	217 1/2 + 13 1/2
22	219 1/2	533 1/2	219 1/2 + 13 1/2
22 1/4	221 1/2	539 1/2	221 1/2 + 13 1/2
22 1/2	223 1/2	545 1/2	223 1/2 + 13 1/2
22 3/4	225 1/2	551 1/2	225 1/2 + 13 1/2
23	227 1/2	557 1/2	227 1/2 + 13 1/2
23 1/4	229 1/2	563 1/2	229 1/2 + 13 1/2
23 1/2	231 1/2	569 1/2	231 1/2 + 13 1/2
23 3/4	233 1/2	575 1/2	233 1/2 + 13 1/2
24	235 1/2	581 1/2	235 1/2 + 13 1/2
24 1/4	237 1/2	587 1/2	237 1/2 + 13 1/2
24 1/2	239 1/2	593 1/2	239 1/2 + 13 1/2
24 3/4	241 1/2	599 1/2	241 1/2 + 13 1/2
25	243 1/2	605 1/2	243 1/2 + 13 1/2
25 1/4	245 1/2	611 1/2	245 1/2 + 13 1/2
25 1/2	247 1/2	617 1/2	247 1/2 + 13 1/2
25 3/4	249 1/2	623 1/2	249 1/2 + 13 1/2
26	251 1/2	629 1/2	251 1/2 + 13 1/2
26 1/4	253 1/2	635 1/2	253 1/2 + 13 1/2
26 1/2	255 1/2	641 1/2	255 1/2 + 13 1/2
26 3/4	257 1/2	647 1/2	257 1/2 + 13 1/2
27	259 1/2	653 1/2	259 1/2 + 13 1/2
27 1/4	261 1/2	659 1/2	261 1/2 + 13 1/2
27 1/2	263 1/2	665 1/2	263 1/2 + 13 1/2
27 3/4	265 1/2	671 1/2	265 1/2 + 13 1/2
28	267 1/2	677 1/2	267 1/2 + 13 1/2
28 1/4	269 1/2	683 1/2	269 1/2 + 13 1/2
28 1/2	271 1/2	689 1/2	271 1/2 + 13 1/2
28 3/4	273 1/2	695 1/2	273 1/2 + 13 1/2
29	275 1/2	701 1/2	275 1/2 + 13 1/2
29 1/4	277 1/2	707 1/2	277 1/2 + 13 1/2
29 1/2	279 1/2	713 1/2	279 1/2 + 13 1/2
29 3/4	281 1/2	719 1/2	281 1/2 + 13 1/2
30	283 1/2	725 1/2	283 1/2 + 13 1/2
30 1/4	285 1/2	731 1/2	285 1/2 + 13 1/2
30 1/2	287 1/2	737 1/2	287 1/2 + 13 1/2
30 3/4	289 1/2	743 1/2	289 1/2 + 13 1/2
31	291 1/2	749 1/2	291 1/2 + 13 1/2
31 1/4	293 1/2	755 1/2	293 1/2 + 13 1/2
31 1/2	295 1/2	761 1/2	295 1/2 + 13 1/2
31 3/4	297 1/2	767 1/2	297 1/2 + 13 1/2
32	299 1/2	773 1/2	299 1/2 + 13 1/2
32 1/4	301 1/2	779 1/2	301 1/2 + 13 1/2
32 1/2	303 1/2	785 1/2	303 1/2 + 13 1/2
32 3/4	305 1/2	791 1/2	305 1/2 + 13 1/2
33	307 1/2	797 1/2	307 1/2 + 13 1/2
33 1/4	309 1/2	803 1/2	309 1/2 + 13 1/2
33 1/2	311 1/2	809 1/2	311 1/2 + 13 1/2
33 3/4	313 1/2	815 1/2	313 1/2 + 13 1/2
34	315 1/2	821 1/2	315 1/2 + 13 1/2
34 1/4	317 1/2	827 1/2	317 1/2 + 13 1/2
34 1/2	319 1/2	833 1/2	319 1/2 + 13 1/2
34 3/4	321 1/2	839 1/2	321 1/2 + 13 1/2
35	323 1/2	845 1/2	323 1/2 + 13 1/2
35 1/4	325 1/2	851 1/2	325 1/2 + 13 1/2
35 1/2	327 1/2	857 1/2	327 1/2 + 13 1/2
35 3/4	329 1/2	863 1/2	329 1/2 + 13 1/2
36	331 1/2	869 1/2	331 1/2 + 13 1/2
36 1/4	333 1/2	875 1/2	333 1/2 + 13 1/2
36 1/2	335 1/2	881 1/2	335 1/2 + 13 1/2
36 3/4	337 1/2	887 1/2	337 1/2 + 13 1/2
37	339 1/2	893 1/2	339 1/2 + 13 1/2
37 1/4	341 1/2	899 1/2	341 1/2 + 13 1/2
37 1/2	343 1/2	905 1/2	343 1/2 + 13 1/2
37 3/4	345 1/2	911 1/2	345 1/2 + 13 1/2
38	347 1/2	917 1/2	347 1/2 + 13 1/2
38 1/4	349 1/2	923 1/2	349 1/2 + 13 1/2
38 1/2	351 1/2	929 1/2	351 1/2 + 13 1/2
38 3/4	353 1/2	935 1/2	353 1/2 + 13 1/2
39	355 1/2	941 1/2	355 1/2 + 13 1/2
39 1/4	357 1/2	947 1/2	357 1/2 + 13 1/2
39 1/2	359 1/2	953 1/2	359 1/2 + 13 1/2
39 3/4	361 1/2	959 1/2	361 1/2 + 13 1/2
40	363 1/2	965 1/2	363 1/2 + 13 1/2
40 1/4	365 1/2	971 1/2	365 1/2 + 13 1/2
40 1/2	367 1/2	977 1/2	367 1/2 + 13 1/2
40 3/4	369 1/2	983 1/2	369 1/2 + 13 1/2
41	371 1/2	989 1/2	371 1/2 + 13 1/2
41 1/4	373 1/2	995 1/2	373 1/2 + 13 1/2
41 1/2	375 1/2	1001 1/2	375 1/2 + 13 1/2
41 3/4	377 1/2	1007 1/2	377 1/2 + 13 1/2
42	379 1/2	1013 1/2	379 1/2 + 13 1/2
42 1/4	381 1/2	1019 1/2	381 1/2 + 13 1/2
42 1/2	383 1/2	1025 1/2	383 1/2 + 13 1/2
42 3/4	385 1/2	1031 1/2	385 1/2 + 13 1/2
43	387 1/2	1037 1/2	387 1/2 + 13 1/2
43 1/4	389 1/2	1043 1/2	389 1/2 + 13 1/2
43 1/2	391 1/2	1049 1/2	391 1/2 + 13 1/2
43 3/4	393 1/2	1055 1/2	393 1/2 + 13 1/2
44	395 1/2	1061 1/2	395 1/2 + 13 1/2
44 1/4	397 1/2	1067 1/2	397 1/2 + 13 1/2
44 1/2	399 1/2	1073 1/2	399 1/2 + 13 1/2
44 3/4	401 1/2	1079 1/2	401 1/2 + 13 1/2
45	403 1/2	1085 1/2	403 1/2 + 13 1/2
45 1/4	405 1/2	1091 1/2	405 1/2 + 13 1/2
45 1/2	407 1/2	1097 1/2	407 1/2 + 13 1/2
45 3/4	409 1/2	1103 1/2	409 1/2 + 13 1/2
46	411 1/2	1109 1/2	411 1/2 + 13 1/2
46 1/4	413 1/2	1115 1/2	413 1/2 + 13 1/2
46 1/2	415 1/2	1121 1/2	415 1/2 + 13 1/2
46 3/4	417 1/2	1127 1/2	417 1/2 + 13 1/2
47	419 1/2	1133 1/2	419 1/2 + 13 1/2
47 1/4	421 1/2	1139 1/2	421 1/2 + 13 1/2
47 1/2	423 1/2	1145 1/2	423 1/2 + 13 1/2
47 3/4	425 1/2	1151 1/2	425 1/2 + 13 1/2
48	427 1/2	1157 1/2	427 1/2 + 13 1/2
48 1/4	429 1/2	1163 1/2	429 1/2 + 13 1/2
48 1/2	431 1/2	1169 1/2	431 1/2 + 13 1/2
48 3/4	433 1/2	1175 1/2	433 1/2 + 13 1/2
49	435 1/2	1181 1/2	435 1/2 + 13 1/2
49 1/4	437 1/2	1187 1/2	437 1/2 + 13 1/2
49 1/2	439 1/2	1193 1/2	439 1/2 + 13 1/2
49 3/4	441 1/2	1199 1/2	441 1/2 + 13 1/2
50	443 1/2	1205 1/2	443 1/2 + 13 1/2
50 1/4	445 1/2	1211 1/2	445 1/2 + 13 1/2
50 1/2	447 1/2	1217 1/2	447 1/2 + 13 1/2
50 3/4	449 1/2	1223 1/2	449 1/2 + 13 1/2
51	451 1/2	1229 1/2	451 1/2 + 13 1/2
51 1/4	453 1/2	1235 1/2	453 1/2 + 13 1/2
51 1/2	455 1/2	1241 1/2	455 1/2 + 13 1/2
51 3/4	457 1/2	1247 1/2	457 1/2 + 13 1/2
52	459 1/2	1253 1/2	459 1/2 + 13 1/2
52 1/4	461 1/2	1259 1/2	461 1/2 + 13 1/2
52 1/2	463 1/2	1265 1/2	463 1/2 + 13 1/2
52 3/4	465 1/2	1271 1/2	465 1/2 + 13 1/2
53	467 1/2	1277 1/2	467 1/2 + 13 1/2
53 1/4	469 1/2	1283 1/2	469 1/2 + 13 1/2
53 1/2	471 1/2	1289 1/2	471 1/2 + 13 1/2
53 3/4	473 1/2	1295 1/2	473 1/2 + 13 1/2
54	475 1/2	1301 1/2	475 1/2 + 13 1/2
54 1/4</			

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 5
Carriage bolts	70, 10 and 5
Leg bolts	70, 10 and 5
Flange bolts, Nos. 1, 2, 3 and 7 heads	70, 10 and 5
Hot-pressed nuts, blank or tapped, square	70, 10 and 5
Hot-pressed nuts, blank or tapped, hexagonal	70, 10 and 5
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 5
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes to and incl. 1 in. diameter	70, 10 and 5
Larger than 1 in. diameter	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, Pittsburgh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60 and 5

Large Rivets
(1/2-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets
(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birmingham	70 and 5

Cap and Set Screws
(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread 1/2 in. and smaller	75
Upset hex. head cap screws, U.S.S. or S.A.E. thread, 1 in. dia. and smaller	87 1/2
Upset set screw, cut and oral point	80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped \$40 per gross ton)

Alloy Steel Blooms, Billets and Slabs
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Base price, \$49 a gross ton)

Alloy Steel Bars
(Price del'd Detroit is \$52.)

(F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton, Open-hearth grade, base \$2.45c. Delivered price at Detroit is \$2.60c. S.A.E.)

Series	Differential per 100 lb.
Numbers	
2000 (1/2 Nickel)	\$0.25
2100 (2 1/2 Nickel)	0.55
2200 (3 1/2 Nickel)	1.50
2500 (5 Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is 1/4c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars
(F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo. 2.95c. base per lb.)

STAINLESS STEEL No. 302
(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)
(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	23c.
Hot-rolled strip	20 1/2c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Re-rolling Ingots

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped \$29 per gross ton)

Carbon Steel Forging Ingots

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham, Uncropped \$31 per gross ton)

Billets, Blooms and Slabs

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Per Gross Ton)

Rolling \$27.00

Forging quality \$2.00

Delivered Detroit \$30.00

Forging 35.00

Billets Only F.o.b. Duluth \$29.00

Rolling \$2.00

Forging 34.00

Sheet Bars

(F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md. Per Gross Ton)

Open-hearth or Bessemer \$28.00

Skelp

(F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md. Per Lb.)

Grooved 1.70c.

Universal 1.70c.

Sheared 1.70c.

Tube Rounds

(Base per Lb.)

F.o.b. Pittsburgh 1.80c.

F.o.b. Chicago 1.85c.

F.o.b. Cleveland 1.85c.

F.o.b. Buffalo 1.90c.

F.o.b. Birmingham 1.95c.

Wire Rods

(Common, base) Per Gross Ton

F.o.b. Pittsburgh \$38.00

F.o.b. Cleveland 38.00

F.o.b. Chicago 39.00

F.o.b. Anderson, Ind. 39.00

F.o.b. Youngstown 39.00

F.o.b. Worcester, Mass. 40.00

F.o.b. Birmingham 41.00

F.o.b. San Francisco 47.00

F.o.b. Galveston 44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$19.50	\$20.00	\$19.00	\$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	20.00	19.00	20.50
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	18.50	18.50	18.00	19.00
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	19.00
Duluth, Minn.	19.00	19.00	19.00	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	17.50	17.00	19.00

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	\$20.00	\$20.50	\$19.50	\$21.00
Brooklyn				
From East, Pa.	21.9289	22.4289	21.9289	22.9289
Newark or Jersey City, N. J.				
From East, Pa.	20.9873	21.4873	20.4873	21.9873
Philadelphia				
From Eastern Pa.	20.3132	20.8132	19.8132	21.3132
Cincinnati				
From Hamilton, Ohio	19.5807	19.5807	19.0807	20.0807
Canton, Ohio				
From Cleveland and Youngstown	19.8402	19.8402	19.3402	20.3402
Columbus, Ohio				
From Hamilton, Ohio	20.64	20.64	19.64	20.64
Mansfield, Ohio				
From Cleveland and Toledo	20.3832	20.3832	19.3832	20.3832
Indianapolis				
From Hamilton, Ohio	20.9289	20.9289	19.9289	20.9289
South Bend, Ind.				
From Chicago	20.6935	20.6935	19.6935	20.6935
Milwaukee				
From Chicago	19.57	19.57	18.57	19.57
St. Paul				
From Duluth	20.94	20.94	19.94	20.94
Davenport, Iowa				
From Chicago	20.3832	20.3832	19.3832	20.3832
Kansas City				
From Granite City	21.2178	21.2178	20.2178	21.2178

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. \$23.50

GRAY FORCE PIG IRON

Valley furnace \$18.00
Pittsburgh district furnace 18.00

CHARCOAL PIG IRON

Lake Superior furnace \$21.00
Delivered Chicago 24.2528
Delivered Buffalo 24.57

CANADA

Pig Iron

Per gross ton: Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	\$21.50
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	21.50
Malleable	22.50
Basic	22.50

FERROALLOYS

Ferromanganese

(F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.)

	Per Gross Ton
Domestic, 80% (carload)	\$35.00

Spiegeleisen

	Per Gross Ton
Domestic, 19 to 21%	\$36.00
50-ton lots 3-mo. shipment	21.00

Electric Ferrosilicon

	Per Gross Ton
50% (carloads)	\$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	138.00

Silvery Iron

(F.o.b. Jackson, Ohio, Furnace)

	Per Gross Ton	Per Gross Ton
6%	\$22.75	12% \$29.50
7%	23.75	13% 30.50
8%	24.75	14% 31.50
9%	25.75	15% 32.50
10%	26.75	16% 33.50
11%	27.75	17% 34.50

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

(F.o.b. Jackson, Ohio, Furnace)

	Per Gross Ton	Per Gross Ton
10%	\$27.75	14% \$33.50
11%	28.75	15% 34.50
12%	29.75	16% 35.50
13%	31.75	17% 37.50

Manganese 1 1/2 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 ton additional. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	\$1.35 to \$1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrocolumbium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrocolumbium, 2% carbon	16.50c. to 17.00c.
Ferrocolumbium, 1% carbon	17.50c. to 18.00c.
Ferrocolumbium, 0.10% carbon	19.50c. to 20.00c.
Ferrocolumbium, 0.06% carbon	20.00c. to 20.50c.
Ferrovandium, del. per lb. contained V.	\$2.70 to \$2.80
Ferrocobalt, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	\$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with \$2 unitage	54.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del. 95c. Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	\$38.00
50-ton lots or less per ton	45.50
Silico-manganese, gross ton, delivered	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	\$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$11.50 to \$12.00
No. 2 heavy melting steel	10.00 to 10.50
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	13.00 to 13.50
Rails, 3 ft. and under	13.50 to 14.00
Compressed sheet steel	11.25 to 11.75
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	10.00 to 10.50
Machine shop turnings	8.00 to 8.50
Short shov. turnings	8.00 to 8.50
Short mixed borings and turnings	6.25 to 6.75
Cast iron borings	6.25 to 6.75
Cast iron car wheels	12.00 to 12.50
Heavy breakable cast	11.50 to 12.00
No. 1 cast	13.00 to 13.50
Rail, knuckles and couplers	14.25 to 14.75
Rail, coil and leaf springs	14.25 to 14.75
Roller steel wheels	14.25 to 14.75
Low phos. billet crops	15.00 to 15.50
Low phos. plate scrap	14.25 to 14.75
Low phos. punchings	14.00 to 14.50
Steel car axles	14.25 to 14.75

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.50 to \$10.00
No. 2 heavy melting steel	9.00 to 9.50
Compressed sheet steel	9.00 to 9.50
Light bundled sheet stampings	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
Machine shop turnings	6.25 to 6.75
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	8.50 to 9.00
Steel axle turnings	9.00 to 9.50
Low phos. billet crops	14.00 to 14.50
Cast iron borings	6.50 to 7.00
Mixed borings and short turnings	6.50 to 7.00
No. 2 busheling	6.50 to 7.00
No. 1 cast	11.00 to 11.50
Railroad grate bars	7.00 to 7.50
Store plate	7.50 to 8.00
Rails under 3 ft.	13.50 to 14.00
Rails for rolling	15.50 to 16.00
Railroad malleable	12.50 to 13.00
Cast iron car wheels	10.75 to 11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$11.00
No. 2 heavy melting steel	10.00
Scrap rails	11.00
New hydraulic, comp. sheets	10.00
Old hydraulic, comp. sheets	9.00
Drop forge flashings	10.00
No. 1 busheling	10.00
Hvy. steel axle turnings	\$8.00 to 8.50
Machine shop turnings	4.50 to 5.00
Knuckles and couplers	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Roller steel wheels	11.50 to 12.00
Low phos. billet crops	12.00 to 12.50
Short shov. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.50 to 7.00
Steel car axles	11.50 to 12.00
Iron axles	11.50 to 12.00
No. 1 machinery cast	11.50 to 12.00
No. 1 cupola cast	10.50 to 11.00
Store plate	9.00 to 9.50
Steel rails, 3 ft. and under	12.50 to 13.00
Coil and leaf springs	11.00 to 11.50
Industrial malleable	12.00 to 12.50
Railroad malleable	12.00 to 13.00
Chemical borings	8.00 to 8.50

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$8.50
No. 1 heavy melting steel	\$6.15 to 6.65
*Scrap T rails	8.50 to 8.75
Scrap rails	8.40 to 8.65
No. 2 steel	7.50
No. 2 steel	5.15 to 5.65
Breakable cast	5.25 to 5.50
Machine shop turnings	2.40 to 2.50
*Machine shop turnings (short)	4.50
Bundled skeleton, long	4.50 to 5.00
Forge flashings	5.00 to 5.50
Shafting	11.75 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
*Store plate	6.25 to 6.50

Per gross ton delivered consumers' yards:	
Textile cast	\$9.00 to \$9.50
No. 1 machinery cast	9.00 to 9.50
Store plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$7.00 to \$8.50
No. 2 heavy melting steel	*\$5.50 to \$7.50
Heavy breakable cast	6.25 to 6.75
No. 1 machinery cast	7.00 to 7.50
No. 1 cast	*\$6.25 to 6.75
Store plate	6.25 to 6.75
No. 1 railroad wrought	7.00 to 7.50
No. 1 yard wrought, long	6.00 to 6.50
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	8.50 to 9.00
Short shoveling turnings	2.00 to 2.50
Machine shop turnings	2.00 to 2.50
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.00 to 4.50

Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$10.00
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	7.50

* For direct car loading only.
† Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$9.00 to \$9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Store plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	11.50
Rails for rolling	12.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	10.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$8.75 to \$9.25
No. 1 heavy melting	8.25 to 8.75
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	9.75 to 10.25
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.25 to 8.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	10.00 to 10.50
Machine shop turnings	2.75 to 3.25
Heavy turnings	5.50 to 6.00
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	6.00 to 6.50
Steel rails less than 3 ft.	11.50 to 12.00
Steel angle bars	9.50 to 10.00
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	8.00 to 8.50
Store plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.50 to \$8.00
Borings and short turnings	4.25 to 4.75

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.50% iron	\$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C. & P. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68 1/2% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 82% 48%	26c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48 1/2%	20c.

Per Gross Ton	
Chromite, 45%, Cr ₂ O ₃ , crude, c.i.f. Atlantic Seaboard	\$17.00
Chromite, 48%, Cr ₂ O ₃ , c.i.f. Atlantic Seaboard	20.00

* Quotations nominal in absence of sales.
† Nominal; no supplies available.

Fluorspar

Per Net Ton	
Domestic, washed gravel, .85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	\$13.90
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	16.00
No. 2 lump, .85-5, f.o.b. Kentucky and Illinois mines	14.00
Foreign, 85% silicon, c.i.f. Atlantic ports, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton	
Furnace, f.o.b. Connellsville	\$3.50 to \$3.75
Prompt	
Foundry, f.o.b. Connellsville	4.00 to 5.10
Prompt	
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, c.i.f.	9.24 to 9.72
Foundry, by-product, Phila.	9.03

Long turnings	\$3.75 to \$4.25
No. 1 machinery cast	11.00 to 11.50
Automotive cast	11.25 to 11.75
Hydraulic, comp. sheets	8.00 to 8.50
Store plate	6.50 to 7.00
New factory busheling	6.75 to 7.25
Old No. 2 busheling	3.75 to 4.25
Sheet clippings	4.75 to 5.25
Flashings	7.25 to 7.75
Low phos. plate scrap	7.50 to 8.00

CANADA

Dealers' buying prices per gross ton:	
	Toronto Montreal
Heavy melting steel	\$7.00 \$7.00
Rails scrap	8.00 8.00
Machine shop turnings	3.00 3.00
Boiler plate	4.50 4.50
Heavy axle turnings	4.50 4.00
Cast borings	4.00 3.50
Steel borings	2.00 2.00
Wrought pipe	3.50 3.50
Steel axles	7.00 8.00
Axles, wrought iron	7.00 8.00
No. 1 machinery cast	9.00 9.00
Store plate	5.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

CHICAGO

Delivered Chicago district consumers:	
	Per Gross Ton
Heavy melting steel	\$9.75 to \$10.00
Automobile hvy. melt. steel	9.00 to 9.50
Shoveling steel	9.75 to 10.00
Hydraulic comp. sheets	8.50 to 9.00
Drop forge flashings	7.50 to 8.00
No. 1 busheling	8.00 to 8.50
Roller car wheels	11.00 to 11.50
Railroad tires	11.50 to 12.00
Railroad leaf springs	10.50 to 11.00
Axle turnings	8.75 to 9.25
Steel couplers and knuckles	10.75 to 11.25
Coil springs	11.75 to 12.25
Coil turnings	9.25 to 9.75
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in. and under	13.00 to 13.50
Cast iron borings	5.00 to 5.50
Short shoveling turnings	5.00 to 5.50
Machine shop turnings	4.75 to 5.25
Revolving rails	10.50 to 11.00
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars, steel	12.00 to 12.50
Cast iron car wheels	10.50 to 11.00
Railroad malleable	12.50 to 13.00
Agricultural malleable	9.50 to 10.00

Per Net Ton	
Iron car axles	\$13.50 to \$14.00
Steel car axles	13.00 to 13.50
No. 1 railroad wrought	7.75 to 8.25
No. 2 railroad wrought	8.25 to 8.75
No. 2 busheling	4.50 to 5.00
Locomotive tires, smooth	10.00 to 10.50
Pipe and flues	5.00 to 5.50
No. 1 machinery cast	9.00 to 9.50
Clean automobile cast	8.50 to 9.00
No. 1 railroad cast	8.00 to 8.50
No. 1 agricultural cast	8.00 to 8.50
Store plate	6.00 to 6.50
Grate bars	5.50 to 6.00
Brake shoes	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.50 to \$10.50
No. 2 heavy melting steel	9.50 to 9.50
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets	9.50 to 10.00
Hydraulic compressed, new	9.50 to 10.00
Hydraulic compressed, old	7.00 to 7.50
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	8.50 to 9.00
Cast borings	4.00 to 4.50
Store plate (steel works)	8.00 to 8.25
Heavy breakable cast	10.50 to 11.00
No. 1 low phos. heavy	13.75 to 14.25
Couplers and knuckles	13.50 to 14.00
Roller steel wheels	13.50 to 14.00
No. 1 blast furnace	4.75 to 5.00
Spec. iron and steel pipe	8.50 to 9.00
Shafting	17.00
Steel axles	16.00
No. 1 forge fire	9.50 to 10.00
Cast iron car wheels	11.00 to 11.50
No. 1 cast	11.00 to 11.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00 to 12.50

* Brokers' buying price for export.

CINCINNATI

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$7.75 to \$8.25
No. 2 heavy melting steel	6.25 to 6.75
Scrap rails for melting	7.75 to 8.25
Loose sheet clippings	4.25 to 4.75
Bundled sheets	5.75 to 6.25
Cast iron borings	4.25 to 4.75
Machine shop turnings	4.25 to 4.75
No. 1 busheling	2.50 to 3.00
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.75 to 9.25
No. 1 locomotive tires	7.00 to 7.50
Short rails	11.25 to 11.75
Cast iron car wheels	7.75 to 8.25
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.75 to 9.25
Burnt cast	5.75 to 6.25
Store plate	5.75 to 6.25
Agricultural malleable	7.75 to 8.25
Railroad malleable	8.75 to 9.25

Warehouse Prices for Steel Products

PITTSBURGH	
	Base per Lb.
Plates	3.13c
Structural shapes	3.13c
Soft steel bars and small shapes	2.90c
Reinforcing steel bars	2.90c
Cold-finished and screw stock:	
Rounds and hexagons	3.20c
Squares and flats	3.20c
Hoops and bands under 1/4 in.	3.20c
Hot-rolled annealed sheets (No. 24)	3.30c
25 or more bundles	3.30c
Galv. sheets (No. 24), 25 or more	3.95c
Hot-rolled sheets (No. 10)	2.95c
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	\$3.69
Spikes, large	2.90c
Track bolts, all sizes, per 100 count	65 per cent off list
Machine bolts, 100 count	65 per cent off list
Carriage bolts, 100 count	65 per cent off list
Nuts, all styles, 100 count	65 per cent off list
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'd, base per 100 lb.	\$2.70
Wire, galv. soft, base per 100 lb.	\$2.925
Common wire nails, per keg	\$2.834
Cement coated nails, per keg	\$2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.
 *Delivered in Pittsburgh switching district.

CHICAGO	
	Base per Lb.
Plates and structural shapes	3.20c
Soft steel bars	2.95c
Cold-finished steel bars:	
Rounds and hexagons	3.35c
Flats and squares	3.35c
Hot-rolled strip	3.30c
Hot-rolled annealed sheets (No. 24)	3.85c
Galv. sheets (No. 24)	4.55c
Hot-rolled sheets (No. 10)	3.05c
Spikes (keg lots)	3.50c
Track bolts (keg lots)	4.65c
Rivets, structural (keg lots)	3.65c
Rivets, boiler (keg lots)	3.75c
Machine bolts	Per Cent Off List
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq. tap or blank	70
Hot-pressed nuts, hex. tap or blank	70
Hot-pressed nuts, hex. tap or blank	70
Hex. head cap screws	80
Cut point set screws	70 and 10
Flat head bright wood screws	37 1/2 and 10
Spring cotter pins	50
Store bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57 1/2
Wrought washers	\$4.50 off list
Black ann'd wire per 100 lb.	\$3.85
Com. wire nails, base per keg	2.95†
Cement c'd nails, base per keg	2.95†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.
 *These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b., Chicago, with full or partial freight allowed up to 50c. per 100 lb.
 †Prices for city and suburbs only.

NEW YORK	
	Base per Lb.
Plates, 1/4 in. and heavier	3.40c
Structural shapes	3.37c
Soft steel bars, small shapes	3.26c
Iron bars	3.26c
Iron bars, swed. charcoal	6.50c
Cold-fn. shafting and screw stock:	
Rounds and hexagons	3.81c

ST. LOUIS	
	Base per Lb.
Plates and struc. shapes	3.45c
Bars, soft steel or iron	3.20c
Cold-fn. rounds, shafting and screw stock:	
Rounds and hexagons (No. 24)	4.10c
Galv. sheets (No. 24)	4.65c
Hot-rolled sheets (No. 10)	3.30c
Black corrug. sheets (No. 24)	4.10c
Galv. corrug. sheets	4.65c
Structural rivets	4.00c
Boiler rivets	4.10c
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws fittings up bolts, bolt ends, pivot bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
All quantities	70

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.
 *No. 26 and lighter take special prices.

PHILADELPHIA	
	Base per Lb.
*Plates, 1/4-in. and heavier	2.98c
*Structural shapes	2.98c
*Soft steel bars, small shapes, iron bars (except bands)	2.93c
*Reinforc. steel bars, sq. twisted and deformed	2.96c
Cold-finished steel bars	3.61c
*Steel hoops	3.43c
*Steel bands, No. 12 and 3/16 in., incl.	3.18c
Spring steel	5.00c
*Hot-rolled anneal. sheets (No. 24)	3.65c
*Galvanized sheets (No. 24)	4.30c
*Hot-rolled annealed sheets (No. 10)	3.08c
Diam. pat. floor plates, 1/4 in.	4.95c
Swedish iron bars	6.25c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
 *Base prices subject to deduction on orders aggregating 4000 lb. or over.
 †For 50 bundles or over.
 ‡For less than 2000 lb.

CLEVELAND	
	Base per Lb.
Plates and struc. shapes	3.31c
Soft steel bars	2.95c
Reinforc. steel bars	2.10c
Cold-finished steel bars	3.25c
Flat-rolled steel under 1/4 in.	3.36c
Cold-finished strip	3.00c
Hot-rolled annealed sheets (No. 24)	3.96c
Galvanized sheets (No. 24)	4.61c
Hot-rolled sheets (No. 10)	3.11c
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c
Black ann'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

†Outside delivery 10c. less.

CINCINNATI	
	Base per Lb.
Plates and struc. shapes	3.42c
Bars, soft steel or iron	3.17c
New billet reinforc. bars	3.25c
Rail steel reinforc. bars	3.25c
Hoops and bands, 3/16 in. and lighter	3.47c
Cold-finished bars	3.57c
Hot-rolled annealed sheets (No. 24)	4.02c
Galv. sheets (No. 24)	4.72c
Hot-rolled sheets (No. 10)	3.22c
Structural rivets	4.35c
Small rivets	55 per cent off list
No. 9 ann'd wire, per 100 lb. (1000 lb. or over)	\$2.88
Com. wire nails, base per keg:	
Any quantity less than carload	3.04
Cement c'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
Seamless steel boiler tubes, 2-in., 4-in., per 100 Ft.	\$21.67
Lap-welded steel boiler tubes, 2-in., 4-in.	20.62
	48.19

BUFFALO	
	Base per Lb.
Plates	3.58c
Struc. shapes	3.25c
Soft steel bars	3.00c
Reinforcing bars	2.60c
Cold-fn. flats and sq.	3.40c
Round and hex.	3.40c
Cold-rolled strip steel	3.19c
Hot-rolled annealed sheets (No. 24)	4.06c
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.63c
Galv. sheets (No. 24)	4.70c
Bands	3.43c
Hoops	3.43c
Heavy hot-rolled sheets	3.18c
Com. wire nails, base per keg:	\$3.33
Black wire, base per 100 lb. (2500-lb. lots or under)	3.55
(Over 2500 lb.)	3.45

BOSTON	
	Base per Lb.
Beams, channels, angles, tees, zees	3.54c
H beams and shapes	3.54c
Plates—sheared, tank and univ. mill,	
1/4 in. thick and heavier	3.56c
Floor plates, diamond pattern	3.56c
Bar and bar shapes (mild steel)	3.35c
Bands 3/16 in. thick and	
No. 12 ga. incl.	3.65c. to 4.65c.
Half rounds, half ovals, ovals and bevels	4.60c.
Fire steel	4.60c.
Cold-rolled strip steel	3.245c.
Cold-finished rounds, squares and hexagons	3.90c.
Cold-finished flats	3.75c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	4.20c.
Galvanized sheets, No. 24 ga.	4.90c.
Lead coated sheets, No. 24 ga.	5.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT	
	Base per Lb.
Soft steel bars	3.04c
Structural shapes	3.42c
Plates	3.42c
Floor plates	3.17c
Hot-rolled annealed sheets (No. 24)	3.94c
Hot-rolled sheets (No. 10)	3.14c
Galvanized sheets (No. 24)	4.72c
Bands	3.39c
Hoops	3.39c
Cold-finished bars	3.49c
Cold-rolled strip	3.18c
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.29c.*
Bolts and nuts	70 and 5 per cent off list

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.
 *Price applies to 1,000 lb. and over.

MILWAUKEE	
	Base per Lb.
Plates and structural shapes	3.31c
Soft steel bars	3.06c
Hot-rolled strip	3.41c
Hot-rolled sheets (No. 10)	3.16c
Hot-rolled annealed sheets (No. 24)	3.96c
Galvanized sheets (No. 24)	4.66c
Cold-finished steel bars	3.61c
Cold-rolled strip	3.30c
Structural rivets (keg lots)	3.86c
Boiler rivets (keg lots)	3.96c
Track spikes (keg lots)	3.71c
Track bolts (keg lots)	4.86c
Black annealed wire	3.10c
Com. wire nails	2.80c
Cement coated nails	2.90c
Machine bolts	Per Cent Off List
Carriage bolts	70
Hot-pressed nuts, sq. and hex., tapped or blank (keg lots)	70

Prices given above are delivered Milwaukee.
 On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on order of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

ST. PAUL	
	Base per Lb.
Mild steel bars	3.20c
Structural shapes	3.45c
Plates	3.45c
Cold-finished bars	3.87c
Bands and hoops	3.55c
Hot-rolled annealed sheets, No. 24	3.90c
Galvanized sheets, No. 24	4.50c
Cold-rolled sheets, No. 20	4.85c

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On cold-finished bars, hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

PACIFIC COAST	
	Base per Lb.
	San Francisco Los Angeles Seattle
Plates, tank and	
U. M.	3.55c. 3.60c. 3.55c.
Shapes, standard	3.55c. 3.60c. 3.55c.
Soft steel bars	3.60c. 3.60c. 3.60c.
Reinforcing bars	
f.o.b. cars dock	
Pacific ports	2.45c. 2.45c. 2.45c.
Hot rolled annealed sheets (No. 24)	4.40c. 4.35c. 4.40c.
Hot-rolled sheets (No. 10)	3.75c. 3.70c. 3.75c.
Galv. sheets (No. 24)	5.00c. 4.95c. 5.00c.
Cold finished steel:	
Rounds	5.95c. 5.85c. 6.00c.
Squares and hexagons	7.20c. 7.10c. 7.25c.
Flats	7.70c. 7.60c. 8.25c.
Common wire nails	
—base per keg	
less carload	\$3.30 \$3.40 \$3.50

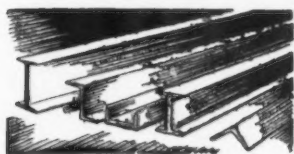
All items subject to differentials for quantity.

TOOL STEEL	
	Base per Lb.
Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.	
High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

Weekly Indications of Steel Activity

From THE IRON AGE					
	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934	Average, Year to Date
					1935 1934
Steel ingot operations—Per cent of capacity	38.0	39.5	43.0	60.0	46.7 48.3
Week Ended					
	June 18, 1935	June 11, 1935	May 21, 1935	June 19, 1934	Year to Date
					1935 1934
Fabricated structural steel awards	25 200	12,915	13,800	28,000	327,553 417,620
Fabricated plate awards	3,610	2,800	1,912	28,000	54,077 73,832
Sheet steel piling awards	0	0	6,830	0	22,145 23,240
Reinforcing bar awards	3,150	1,980	3,500	10,115	105,355 105,535

Philadelphia Output Declines; Consumers Continue Cautious



Miscellaneous Ordering is Lighter—
Budd May Place 40,000 Tons of Sheets
This Week—Scrap Continues Steady

PHILADELPHIA, June 18.—Even though the market surface appears calm there is still considerable under-cover agitation for secret price shading in this district. In spite of this, all mills in this area continue to hold to their decision to maintain quotations at published levels.

Bethlehem continues to operate on an unchanged schedule, Phoenix is down to one furnace and Worth Steel Co. has taken off one of its two active units. Likewise, Alan Wood may take off one of its two furnaces during the next week if ingot stocks continue to build up at the present rate. All these changes have resulted in a one-point decline in district operations to 31 per cent of potential capacity.

Although this district is not a large consumer of cold-drawn steels, the miscellaneous demands for products of this type are holding up better in proportion than are the demands for flat-rolled and construction steels. Bolts and nut ordering continues to be very light. Sellers are offering less-than-carlots at a discount of 70-10-5, but carlots are available at 70, 10 and 10 per cent off.

Pig Iron

The Standard Sanitary Mfg. Co. has purchased 1500 tons of Southern iron for immediate delivery, a good portion of which will be melted in this company's Baltimore plant. The average smaller foundry in this area is apparently working on an unchanged schedule as miscellaneous small-lot coke orders are in greater volume than they were a month ago. Also, miscellaneous deliveries of iron are equal to those of a month ago. This iron buying practically represents current consumption, for no foundry is willing to purchase much more than a month ahead. There have been quite a number of proposals for quiet price reductions on iron orders, but all indications point to a firm adherence to published prices on the part of district sellers. Distributors of foreign

iron continue to offer tonnages at least \$1 a ton under domestic levels.

Sheets and Strip

Users of hot-rolled strip continue to order in fair quantities, but other flat-rolled products are now in considerably less demand than they were a month ago. This contraction in ordering is a reflection of the seasonal summer lull in fabricating activity and it is also a result of continued delay in shipments to some consumers who are holding to this action in an effort to force down prices. So far there is no known instance of shading in prices for either small or large orders. It is very probable that the E. G. Budd Mfg. Co. will announce its purchase of over 40,000 tons of heavy sheets for Chevrolet frames before the end of the week. Placing the order in this district would be of considerable help, for the average operating rate here is considerably lower than in many other steel centers.

Bars, Plates and Shapes

The Pennsylvania Railroad is opening bids on third quarter requirements today involving about 5000 tons of miscellaneous bars, plates, shapes and railroad supplies. Otherwise these commodities continue exceptionally quiet. Many fabricators have little or no work to figure on, and, consequently, are looking forward to an early release of a portion of the much-heralded Federal works relief funds. Pennsylvania's administrator E. N. Jones predicts 50,000 relief recipients transferred to work relief during the next month. Good quantities of steel should be required if these workers are employed in the building of pending grade eliminations and similar projects.

The Atlantic Refining Co. has placed 600 tons of plates for miscellaneous tanks in Pennsylvania. Bethlehem Contracting Co. will furnish 125 tons of miscellaneous framing for Lehigh Navigation Coal Co. at Tamaqua, Pa., and the Belmont Iron Works has been awarded 215 tons of shapes for a

Celanese Corp. building at Cumberland, Md. No new projects of any size have come up for bidding during the week. A local shipyard opened bids on a small tonnage of plates and one seller's quotation was below the published price. This variance was attributed to a clerical mistake by the company and the bid was then withdrawn. The shipyard subsequently placed the tonnage with another producer.

Scrap

Domestic scrap, despite a continued lack of demand, has a stronger undertone. This situation arises from the absence of distress scrap and also to a sustained demand for foreign shipment. Brokers continue to pay \$9.50 and \$8.50 respectively for No. 1 and No. 2 steel at Port Richmond, but deliveries from dealers at these price levels are not as heavy as they were earlier in the year. Nevertheless the flow of scrap to Port Richmond is sufficient to take care of all the boats available for Japanese and Italian deliveries. Japan has practically dropped out of the market for new scrap commitments, but both England and Italy have purchased fair quantities during the past week.

Railroad Equipment

Aliquippa & Southern has ordered one 0-8-0 switching locomotive from American Locomotive Co.

Bangor & Aroostook has ordered two locomotives of 4-8-2 type from American Locomotive Co.

Chesapeake & Ohio opened bids June 17 on 5000 hopper cars, 75 flat cars and 50 stock cars.

Chicago, Burlington & Quincy has ordered from Timken Roller Bearing Co., Canton, Ohio, bearings to equip all driving axles of three more of its class M4 2-10-4 high speed freight locomotives. In addition, the Burlington has ordered from Timken company bearings to equip all driving axles of one of its class 4-8-4 heavy freight engines. This change-over work is being done in Burlington shops.

E. G. Budd Mfg. Co., Philadelphia, has placed an order with Timken Roller Bearing Co., Canton, for bearings and boxes to equip all axles of the new four-car Mark Twain Zephyr streamlined high-speed train for Chicago, Burlington & Quincy Railroad.

RAILS AND TRACK SUPPLIES

Wabash Railway is inquiring for 5000 tons of 112-lb. rails for July and August delivery.

United States Engineers opened bids at Portland, Ore., on 667 tons of rails, 78 tons of angle bars and 225 tons of spikes, bolts and plates for Bonneville railroad relocation. Although Bethlehem Steel Co.'s bid was lowest, the freight differential will probably make Colorado Fuel & Iron Co. low bidder.

Missouri Pacific Trustees have been granted permission to purchase 10,000 tons of rails in anticipation of a possible increase in the price of new steel rails at the mills before close of the year. Estimated cost of rails and fastenings is \$573,900. The purchase is in addition to 5000 tons authorized earlier in year.

Decline in Demand is Checked at Cleveland



Ingot Rate, However, Is Off Two Points to 41 Per Cent—Private Construction Gains—Scrap Recedes

CLEVELAND, June 18. — An improvement in orders from consumers in some fields, particularly for bars and sheets, has checked the seasonal decline in the demand for finished steel. Business with some of the mills was better during the week than in the period of uncertainty over the maintenance of prices that followed the elimination of the NRA. Tonnage entered so far this month compares favorably with May.

Ingot output in Cleveland has remained unchanged for six weeks, although in the Cleveland-Lorain territory there was a drop of two points this week to 41 per cent of capacity due to the taking off of one open-hearth furnace in Lorain.

The automotive industry continues to place steel, but in reduced quantities, to round out stocks for present models. New orders were placed by Ohio plants making automobile running boards and fenders. Automobile parts manufacturers are now figuring on parts for new models. Orders for sheets from stove manufacturers have taken an upward spurt. New demand from refrigerator manufacturers is slack.

The Chesapeake & Ohio Railroad took bids Monday against its inquiry for 5175 freight cars. As tabulation of the bids and making of awards will take some time, it probably will be several weeks before the 65,000 or more of steel required for these cars will reach the mills.

Structural awards aggregate 1700 tons for private work in nearby territory, being the best week for some time in the amount of private construction. No deviation from regular prices or pressure for concessions is reported. A test is expected on considerable tonnage of reinforcing bars to be placed shortly.

Steel-making scrap has declined.

Pig Iron

While demand has tapered, a leading Lake furnace interest continues to sell several thousand tons a week in quantities ranging from

car lots to 1000 tons. Consumers are not placing contracts for the quarter. Demand is holding up well from manufacturers of agricultural implements, heating equipment and machinery. Foundries making castings for motor trucks continue quite busy, as production of trucks has not slowed down like the manufacture of passenger cars. No deviation is reported from regular prices.

Sheets

New demand improved somewhat the past week after a lull that followed the NRA decision. Some business to round out stocks came from automobile makers and Fisher Body plants, and sizable lots were placed by Ohio stamping plants for Ford running boards and automobile foundries. Business from stove manufacturers, which slumped a few weeks ago, took an upward turn and enameling sheets are in good demand from other sources. The local sheet mill is operating at 55 per cent of capacity this week, and the Newton plant at Monroe, Mich., resumed operations after a week's shut-down.

Strip Steel

Business from the automotive industry is light, particularly in cold strip. General Motors units making automobile parts are taking shipments against recent purchases but are placing no new business. The local cold strip mill is operating this week at 30 per cent of capacity.

Iron Ore

Consumption of ore during May was 2,466,585 gross tons, an increase of 106,583 tons over April. This compares with 2,957,934 tons melted during May last year. Furnace stocks June 1 were 21,202,734 tons, and stocks at furnaces and Lake Erie docks were 25,324,575 tons as against 25,556,502 tons on the same date last year. Central district furnaces during May consumed 1,268,105 tons, an increase of 49,790 tons over April. Lake front furnaces used 1,186,489 tons,

a gain of 53,114 tons, and all-rail furnaces melted 11,533 tons, an increase of 3797 tons. Eastern furnaces used 458 tons, a loss of 118 tons. There were 80 furnaces in blast using Lake ore May 31, a decrease of three for the month.

Bolts and Nuts

The seasonal slump in business is less than anticipated. Demand from the automotive industry is holding up well, and orders from implement manufacturers continue good. Business from railroads shows a slight gain. The allowance of an extra 10-point discount to jobbers for car lots has become universal.

Bars, Plates and Shapes

With some new business from forge shops and other consumers in the automotive field, orders for merchant bars have gained moderately. A fair demand is being maintained from makers of oil-country goods. Automobile rim sections in sizeable lots were placed. In the construction field there was an increase in the awards of private work. The Greer Steel Co. placed 800 tons of structural shapes for its Anderson, Ind., mill with an Ohio fabricator. The Pennsylvania Railroad placed 500 tons for a freight station in Erie, and factory buildings were awarded in Toledo and East Liverpool, requiring about 400 tons. The Nickel Plate Railroad will take bids June 28 for a bridge requiring approximately 1000 tons. Bids calling for several thousand tons of structural shapes and bars will be taken in the next few days by the United States Engineers, Zanesville, Ohio, for the Muskingum District Conservancy project.

Scrap

Prices on heavy melting steel and other steel-making grades have declined 50c. a ton in the absence of any new consumer demand to support the market. Cast scrap and railroad malleable are also down. Blast furnace grades are unchanged. There is little activity among dealers, as mills have taken in most of the scrap due on contracts.

A revised copy of "Timken Steel Specifications" has been issued by the Timken Steel & Tube Co., Canton, Ohio. In addition to alloy and carbon steels of S.A.E. classification, the revised sheet also gives specifications for Krupp, Ni-Cr-V and the special corrosion and heat-resisting steels produced by the Timken company.

Bids Taken on Bridge In St. Louis District

ST. LOUIS, June 18.—The American Bridge Co. and the Mount Vernon Bridge Co. are the joint low bidders on the superstructure for the Wabash Railway bridge over the Missouri River near St. Charles, requiring 8500 tons of structural steel. The bid was \$1,041,098. This is a PWA project. The Wabash Railway is in the market for 5000 tons of 112-lb. rails for July and August delivery.

The Shell Petroleum Corp. has asked for bids on storage tanks for use in Texas, which will require 2200 tons of tank plates. Contracts for highway bridges awarded to St. Louis fabricators have enabled them to step up operations to about 30 per cent of capacity, with one of the seven plants operating at full capacity.

Buyers of finished iron and steel seem convinced that producers mean business in their statements that the price structure is to be maintained, but the formers' customers are said to be not so firmly of the same mind, which has caused some slowing up of business. Warehouse business for the first half of June is reported to be in about the same volume as in the same period in May.

New business in pig iron is in small volume. Some melters are said to have been sufficiently covered to carry them into the third quarter, while others still maintain a waiting attitude. Shipments are fair.

The scrap market is extremely dull. Mills are not buying, and dealers are said to be covered on all short orders. Offerings are light, and no distress scrap is reported. The Missouri Pacific sold a list of 80 carloads of scrap last week, most of it going to Western markets. Prices are unchanged.

Production Off At Buffalo

BUFFALO, June 18. — Open-hearth furnace operations have been reduced at the Lackawanna plant of the Bethlehem Steel Corp., which is now running eight units instead of nine; Republic Steel Corp. is operating three with week-end shutdowns; Wickwire-Spencer Steel Corp. has one active furnace. The Seneca sheet division of Bethlehem has dropped its oper-

ations another five points, being down to 65 per cent of capacity.

A Buffalo fabricator has the contract to furnish 500 tons of structural steel for a new New York Central station in Syracuse, N. Y. A bridge in Hornell, N. Y., 125 tons, is reported to have been taken by another Buffalo fabricator. Several jobs of 10, 20 and 25 tons have been awarded.

The scrap market is running into summer dullness. Dealers are not disposed to sell at present prices, and even find it difficult to buy. Most yards are busily engaged trying to accumulate a surplus. A sale of short rails in the vicinity of Buffalo at \$13.50 is reported. Considerable boat scrap is coming into local mills.

The pig iron market is quiet.

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Mill Prices Are Steady In New York District



Delays in Buying Do Not Affect Current Requirements—Price Irregularities Crop Out in Resale Field

NEW YORK, June 18.—So far as the mills are concerned the trade in this district seems to be satisfied with the current price structure and is exerting little, if any, pressure for lower quotations. Though some forward buying is probably being delayed, pending a possible break in the market, the passing of the code has had almost no effect on the placing of orders for current needs. Aggregate bookings are slowly receding but the decline is not more than seasonal. Tin mills, which have been embarrassed to the point of being forced to curtail operations because of a congestion of stock in their warehouses, are again receiving shipping orders from can makers. The stock accumulations represent plate that had been ordered but failed to move because late vegetable packs delayed can manufacturing programs.

New York State's total share of PWA appropriations has been cut down from \$40,000,000 to \$29,000,-

000, of which \$11,000,000 will be for highways, \$13,000,000 for grade crossings and \$5,000,000 for deepening the barge canal between Waterford and Oswego. Demand for reinforcing steel is improving.

The Interborough Rapid Transit Co., New York, is in the market for its last half's requirements in wheels. The general contract for a paper mill at Savannah, Ga., for the Union Bag & Paper Co., requiring 1500 to 2000 tons of structural steel, has been awarded to the Merritt-Chapman & Scott Corp., New York. American Bridge Co. is low bidder on 6200 tons of structural steel for the superstructure of the Henrik Hudson bridge at Spuyten Duyvil, connecting Manhattan and the Bronx. The steel for Russian stills, for which Alco Products, Inc., has the contract, will not be placed until the latter part of the year. The five locomotives for which the Chesapeake & Ohio is inquiring will

require about 400 tons of plates, wheels, forgings and axles.

While mill prices are apparently holding firmly, resale quotations of jobbers are increasingly irregular.

Pig Iron

Current sales continue to represent consumption, for practically no buyer is booking more than six weeks ahead. Total bookings for the past seven-day period only reached 1000 tons, as compared with 1150 tons in the preceding period and 1450 tons sold a fortnight ago. Although some grades of foreign iron are available at least \$1 a ton under the quoted market, there is no apparent weakness in the domestic price level. With only routine and small inquiries in the market, however, sellers have no particular inducement to offer iron at lower levels.

Reinforcing Steel

Concrete Steel Co. will furnish 110 tons for a college building at West Hartford, Conn., and a sewer in Hastings, N. Y., requiring 100 tons, has been let to Truscon Steel Co. Also, about 440 tons of bars was let to Joseph T. Ryerson & Son, Inc., for an incinerator in Flushing, N. Y. Bids go in July 2 on 550 tons of mesh for highway construction in Queens and Erie counties, N. Y., and about 2700 tons of bars is still active in this territory for three different projects. Although the market appears to have a little more life, there is still far from enough business to keep distributors even moderately satisfied. After the final awards of the several projects now active, there is little to look forward to for the summer months.

Scrap

Brokers are buying heavy melting steels in undiminished volume to cover outstanding export commitments. New export bookings, however, are not nearly as plentiful as they were earlier in the year. With Japan practically out of the market and stating intentions of staying out for the summer months, it is only natural that the export situation should develop some easiness in the near future, particularly if there is no revival in domestic demand. One broker continues to purchase No. 2 steel alongside barge at \$7.50 a ton, but other brokers are keeping bids under this level and apparently are securing sufficient tonnage to meet their contracts. A little more steel is moving into domestic consumption, with No. 1 shipments going to Bridgeport and No. 2 being shipped to Buffalo. Several eastern brokers offered bids in the re-

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cent sale of certain sections of the Washington, Baltimore and Annapolis Electric Railroad, probably the largest single scrap sale of the past year. Continental Iron & Steel Co. bid in a 21-mile track section for \$58,500, and a good portion of this rail tonnage will probably be exported if this provisional sale is approved by the court.

Output Cut Sharply In South

BIRMINGHAM, June 18.—Buyers of pig iron and steel products, in general, are confining their orders to current requirements. There has been little forward buying for the third quarter.

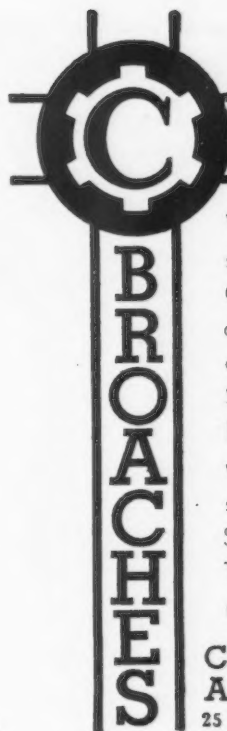
Consumption of pig iron is holding up fairly well. Soil pipe production is said to be the best in two years, while stove plants continue at a good rate. Pressure pipe melt has shown a slight recession in the past several weeks, but has prospects for a considerable increase just as soon as the new PWA program starts.

New business in sheets and wire products is restricted, reflecting seasonal dullness. While some jobbers are buying to fill actual needs, a majority is still postponing contracting for stock requirements. Plates and structural shapes are moving only when fabricators secure new business requiring them.

Active furnaces were reduced to eight last week and open-hearths to six. The Tennessee Coal, Iron & Railroad Co. closed down its five Ensley open-hearths on June 11 and also blew out two Ensley furnaces, No. 2 and No. 5, on the same date. On June 12 the rail mill was stopped. One Ensley furnace continues in operation on special grades of foundry iron.

Pressure pipe business is lighter and operations now average about three days a week instead of four. Fort Smith, Ark., opened bids June 17 on about 1200 tons of cast iron water pipe for its distribution system. Bids were also opened on a 20-mile supply line, but cast iron pipe manufacturers have little hope of securing this.

Greater safety and ease of handling are specified for an improved self-coupler for industrial trailers. The device is manufactured by Mercury Mfg. Co., 4119 South Halsted Street, Chicago. A new, flat-top coupler jaw is installed flat with the trailer deck and offers no obstruction to an overhanging load. The latch-dog is underneath and is released by foot pressure on either of its side-pads.



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We have helped many concerns to substantial savings by designing for them a **CONNECTICUT PRECISION BROACH** which—in one operation—did the work formerly needing two or more broaches and as many operations. Savings have been reported as high as 75%. Perhaps a study of your broaching methods would enable our engineers to point you to similar reductions in your broaching costs. Such a study will not obligate you in the least. The figures must speak for themselves. Why not write us—today?

**CONNECTICUT BROACH
AND MACHINE COMPANY**
25 PEQUOT AVE. NEW LONDON, CONN.

Demand Tapers in Southern Ohio

CINCINNATI, June 18.—The usual seasonal tapering in finished sheet demand has depressed the volume of new business in this area to about 50 per cent of mill capacity. The sharpest decline is reported from the automotive industry where the management is watching the trend of retail sales before making more than necessary commitments for materials. Galvanized steel continues to attract more than the average market demand and the leading interest indicates that galvanized units are operating at near capacity, but the general average of current production is about 55 per cent. While some sniping at price schedules from isolated consumers is reported, the steady adherence of mill interests to published prices tends to restrain a general consumer attack upon quotations.

Movement of pig iron tends to slacken in keeping with seasonal influences. Inventories of melters are almost nil and current bookings of about 600 tons a week reflects spot needs. Price schedules are being well maintained, with relatively no pressure from purchasers. The melt continues at a steady pace, with stove foundries more active. A small improvement in the machine tool melt adds en-

couragement to the general outlook. A southern Ohio melter is inquiring for 500 tons of a northern foundry iron. This is the first substantial inquiry in this area for about two months.

Voluntary compliance of steel jobbers with code provisions is holding prices firm. Business volume is on a lower level than in May and displays the depressing influence of warm weather.

The district scrap market is without feature. With mill operations reduced, interest in old materials is almost nil. Dealer speculation is absent, the only market purchases being for immediate application upon old contracts. Prices generally are weaker and current schedules are reported nominal. Malleable scrap, in substantial demand for the preceding two weeks, is losing ground and is sharing the general weakness of the market.

A new type pipe coupling, manufactured by S. R. Dresser Mfg. Co., Bradford, Pa., features two resilient "armored" gaskets which compress tightly around the pipe, gripping with extreme force and providing a positive seal. The resulting joint is said to absorb normal vibration, expansion and contraction movements and to permit of deflections of the pipe within the joint.

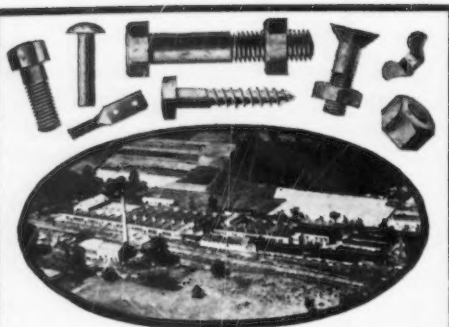
The Products

The Plant

The Question

The Name

The Location



Do you use such products and do you appreciate quality, prompt deliveries, attention, and perfect packaging?

If so write

CLARK BROS BOLT CO.

CLARK STREET
MILDALE, CONNECTICUT

Fabricated Structural Steel

Lettings in Good Volume—New Projects Decline

AMONG structural steel awards of 25,200 tons, the outstanding bookings are 8500 tons for a bridge at St. Charles, Mo., for the Wabash Railway and 6200 tons for the superstructure of the Henry Hudson bridge at New York. New projects of 11,200 tons compare with 16,275 tons last week and 9850 tons two weeks ago. With the exception of 4500 tons of plates and shapes for the Norfolk & Western Railroad the bulk of new inquiries reported is in small tonnages. Plate awards account for 3610 tons with more than 16,000 tons pending. Sheet piling inquiries call for 5250 tons. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Millikens Crossing, Me., 280 tons, bridge, to American Bridge Co.

Hallowell, Me., 310 tons, highway bridge, to American Bridge Co.

Branford, Conn., 280 tons, Atlantic Wire Co. building, to McClintic-Marshall Corp.

Tottenville, N. Y., 1100 tons, high school, to McClintic-Marshall Corp.

Eastview, N. Y., 1860 tons, Westchester County Home, to Bethlehem Fabricators, Inc.

New York Central Railroad, 500 tons, passenger station at Syracuse, N. Y., to McClintic-Marshall Corp.

Hornell, N. Y., 125 tons, bridge, to a Buffalo bidder.

New York, 6200 tons, superstructure for Henry Hudson bridge, to American Bridge Co.

Tamaqua, Pa., 135 tons, miscellaneous framing for Lehigh Navigation Coal Co., to Bethlehem Contracting Co.

Cumberland, Md., 225 tons, building for Celanese Corp., to Belmont Iron Works.

Erie, Pa., 500 tons, freight house for Pennsylvania Railroad, to Rust Engineering Co., Pittsburgh.

THE SOUTH

Florence, Ala., 285 tons, highway bridge, to Virginia Bridge & Iron Co.

Panama City, Fla., 285 tons, warehouse and dock, to Stupp Brothers Bridge & Iron Co.

Tampa, Fla., 230 tons, building for American Can Co., to Jones & Laughlin Steel Corp.

Yazoo, Miss., 170 tons, State highway bridge, to Nashville Bridge Co.

CENTRAL STATES

Toledo, Ohio, 135 tons, extension for Libby-Owens-Ford Glass Co., to Fort Pitt Bridge Works Co.

East Liverpool, Ohio, 254 tons, factory for Potters Supply Co., to Truscon Steel Co.

Pontiac, Mich., 800 tons, Fisher Body Corp. storage building, to Jones & Laughlin Steel Corp.

Chicago & North Western Railroad, 160 tons, bridge at West Allis, Wis., to McClintic-Marshall Corp.

Fort Wayne, Ind., 375 tons, Joslyn Mfg. Co., to Gage Structural Steel Co.

Anderson, Ind., 800 tons, mill building for Greer Steel Co., to Burger Iron Co.

Chicago, 460 tons, sewage works, to Inland Steel Co. and Duffin Iron Co.

East St. Louis, Ill., 250 tons, mill for Monsanto Chemical Works, to Stupp Brothers Bridge & Iron Co.

Wabash Railway, 8500 tons, bridge at St. Charles, Mo., to American Bridge Co. and Mount Vernon Bridge Co.

WESTERN STATES

San Francisco, 350 tons, bridge, to American Bridge Co.

Los Angeles, 215 tons, Magnus Corp. mill building, to Pacific Iron & Steel Co.

Los Angeles, 165 tons, tunnel I beams for Metropolitan Water District, to Commercial Shearing & Stamping Co.

Almira, Wash., 200 tons, crushing plant at Grand Coulee dam, to Isaacson Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

West Seneca, N. Y., 200 tons, Erie County highway bridge.

Washington, 200 tons, Parkwood Trading Co. theater.

Nickel Plate Railroad, 1000 tons, bridge at State Line, Pa.; bids June 28. Previously reported but location not heretofore announced.

SOUTH AND SOUTHWEST

Roanoke, Va., 4500 tons, shapes and plates for Norfolk & Western Railroad third quarter requirements; bids June 26.

Petersburg, Va., 165 tons, postoffice.

Florida Sea Coast Railway, 400 tons, bridge at Stuart, Fla.

Athens, Ala., 250 tons, bridge.

Savannah, Ga., 1500 to 2000 tons, pulp and paper mill for Union Bag & Paper Co.; general contract let to Merritt-Chapman & Scott Corp., New York.

Yuma, Ariz., 400 tons, roller gates for dam, United States Bureau of Reclamation.

CENTRAL STATES

Hiram, Ohio, 118 tons, Hiram College building; general contract awarded to Dunbar Co., Cleveland.

Perrysville, Ohio, 300 tons, tunnel.

Wayne County, Mich., 200 tons, Grosse Point tennis court building.

Clinton, Iowa, 325 tons, lock.

Fort Dodge, Iowa, 600 tons, bridge.

Waterloo, Iowa, 200 tons, Deere & Co. building.

Red Wing, Minnesota, 900 tons, lock; also 110 tons of forgings.

WESTERN STATES

Mineral County, Mont., 250 tons, State bridge over St. Regis River; bids soon.

Casper, Wyo., 877 tons, Alcova dam for Bureau of Reclamation; bids July 15.

Fresno, Cal., 400 tons, city auditorium; new bids open July 11.

Los Angeles, 165 tons, tunnel beams for Metropolitan Water District; bids cancelled.

Los Angeles, 100 tons, head frame for Pacific Coast Borax Co.

Santa Fe Springs, Cal., 100 tons, administration building and machine shop for Wilshire Oil Co.; general contract awarded.

Anaheim, Cal., 200 tons, school; bids July 2.

Bonneville Dam, Ore., 160 tons, fishways.

Chelan County, Wash., 330 tons, State bridge over Toutle River; bids soon.

FABRICATED PLATES

AWARDS

Troy, N. Y., 1262 tons, gas holder, to Bartlett-Hayward Co.

Freeport, Ill., 235 tons, standpipe for Illinois Water Service Co., to Chicago Bridge & Iron Works.

State of Tennessee, 1218 tons, radial and trash gates for TVA, to Worden-Allen Co.

Wilmington, N. C., 245 tons, gasoline storage tanks, to Chicago Bridge & Iron Works.

Fort Morgan, Colo., 350 tons, pipe, to Thompson Mfg. Co.

Grand Haven, Mich., 300 tons, scow, to McClintic-Marshall Corp.

NEW PROJECTS

Cincinnati, 6000 to 9000 tons, plates and shapes, 20 to 30 steel barges for Mississippi Valley Barge Lines Co.; bids by July 1.

St. Louis, 2200 tons, storage tanks for use in Texas for Shell Petroleum Corp.

Mare Island, Cal., 193 tons, cold rolled sheets for Navy Yard, Specification 4245.

Clinton, Iowa, 375 tons, gates for dam.

Fort Smith, Ark., 5250 tons, water pipe.

SHEET PILING

NEW PROJECTS

Sheffield, Ala., 4000 tons, piling for Pickwick Dam.

Clinton, Iowa, 1250 tons, for dam.

Cast Iron Pipe

Mystic Fire District, Mystic, Conn., has plans for a municipal water system at Stonington, Conn.

Smithsfield, R. I., will readvertise for bids on 1200 tons of 6 to 12-in. pipe before or about July 1.

Metropolitan District Commission, Hartford, Conn., has plans for a water extension from Windsor to Poquonock.

Cotuit, Mass., has plans for a water system to cost about \$130,000. Whitman & Howard, 89 Broad Street, Boston, are engineers.

Board of Commissioners of Galveston County, Galveston, Tex., plans about 42,680 ft. of 6-in. for water system. Cost about \$46,000. Financing is being arranged through Federal aid. C. C. Washington is County engineer.

Bureau of Reclamation, Denver, asks bids until July 8 for approximately 1,000,000 lb. of pipe, valves and fittings for Boulder power plant, Boulder Canyon Project, Arizona-California-Nevada (Specifications 627).

Abingdon and Glade Springs, Va., plan pipe lines for joint water system. Bonds for \$428,000 have been approved. Financing will be arranged through Federal aid.

Mount Morris, Mich., plans pipe lines for water supply. Fund of \$30,000 is being arranged for this and other waterworks installation. Francis Engineering Co., Eddy Building, Saginaw, Mich., is consulting engineer.

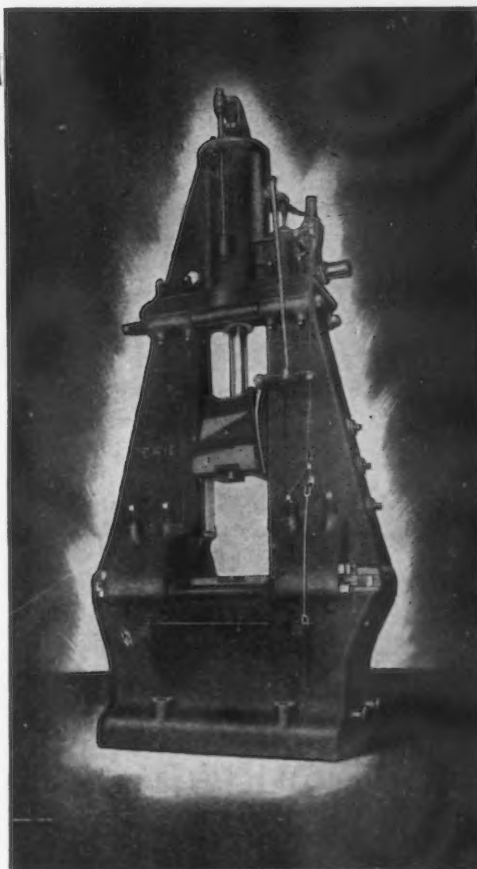
Bremerton, Wash., plans new main water pipe line, cost about \$15,000, and extensions in pipe line distribution system, cost about \$10,000; also new pumping station and other water system improvements. C. C. Casad, commissioner of public works, is in charge.

Elk City, Okla., has completed plans for new water pipe lines and other waterworks installation. Fund of \$350,000 is being arranged through Federal aid. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Heber City, Utah, has called special election July 2 to approve bonds for \$33,000 for water pipe lines and new reservoir. Financing will be arranged through Federal aid.

Greelyville, S. C., plans pipe lines for water system and other waterworks installation. Fund of \$35,000 is being arranged through Federal aid.

You Pay for What You Need whether you get it or not



We don't want to sell you a hammer *unless you need it*. We know that there are hundreds of forge shops where new hammers are needed, but where the purchase is being put off under the false notion that it is economy to run the old machines. Is your shop one of these?

If you need new hammers you are paying for them, in high operating costs and high maintenance expense, in low production and costly delays and loss of business. And after you have paid, you have nothing to show for your money.

Since you are going to spend that money anyhow why not put it into a permanent investment in modern ERIE hammers, that will earn dividends for you, year after year?

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INDIANAPOLIS: 335 POSTAL STATION BUILDING
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Haskell, Tex., plans pipe lines for water system. Bonds for \$35,000 are being arranged for this and other waterworks construction.

Rouseville, Pa., plans water pipe lines and other waterworks improvements. Cost close to \$25,000.

Prairie, Ore., will soon take bids for about 2½ miles of 4-in. for water system; also for new reservoir and other waterworks improvements.

Oakland, Md., plans pipe lines for auxiliary water system. Bond issue of \$25,000 has been authorized.

Botetourt County Commissioners, Fincastle, Va., plan pipe lines for water supply. Bond issue of \$55,000 is being arranged for this and other waterworks

installation; special election has been called on June 25.

Orangeville, Utah, awarded 100 tons of 2 and 4-in. to Pacific States Cast Iron Pipe Co.

Jacksonville, Ore., has advanced bids on 138 tons to June 27.

Inglewood, Cal., has taken bids on 100 tons on which United States Pipe & Foundry Co. is low bidder.

Los Angeles County Sanitation District will open bids July 2 on 5546 ft. of 60-in. for White Point outfall sewer. Specifications have not been issued so weight and type of pipe is not yet definitely known.

San Bernardino, Cal., has opened bids on 232 tons of 8 and 12-in. class 250.

"HERCULES" RED-STRAND WIRE ROPE

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Furnished in Flattened Strand, Round Strand, Preformed, Steel Clad and Non-Rotating constructions.

A GIANT
in Strength and
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NEW YORK
CHICAGO
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SAN FRANCISCO

Activities Bearing on Machine Tool Distribution

A Department Conducted by L. M. Waite

Better-Made Machine Tool Sales

APROPOS general discussions as to better-made machine tool sales, a prominent American manager, now associated with an export organization, has called attention to what he believes to be an obvious necessity for constructive effort to relieve the machine tool industry of some of the expense which it has assumed in connection with the distribution of its products. The following letter, outlining what he believes to be harmful elements in the existing method of selling machine tools, we are glad to present. He says:

"I refuse to be left out of the parade of opinions on the American method of machine tool sales and distribution. I dislike the much abused but prevailing system of 'demonstration-service'.

"Although for some time I have been associated, primarily here in the United States, with the foreign end of the activity, I still admit

knowing something about the domestic angle of selling machines and then often playing the fond papa to them for a length of time almost sufficient for them to reach the second-hand stage.

"There was a time when the man with a Main street shop bought his mechanical contrivances, had them shipped to him knocked down, proceeded to set them up, and to learn something of their construction in so doing. He frequently followed through with valuable design and assembly tips to the manufacturer.

"In the past, American machine tool builders learned much about their own devices from export customers who were dependent upon their own abilities and were both observant and critical when setting up new machines in shops far remote from original birthplaces and having no available service such as is now supplied so freely.

"There is a constant complaint by makers that customers today, in

both the lesser shops and in the huge production plants, must be pampered and coddled with this demonstrator service at a total cost directly related to the general lack of profits said to exist within the industry. Yet there is a tremendous total of competitive expenditure involved in supplying estimates of production to firms who have very questionable need for proposed equipment, and who, if they do buy, will insist upon the last drop of estimated-production blood, with themselves as sole judges as to acceptable performance.

"We often hear present times described as the machine age, but an analysis of the so-called machine demonstrator policy indicates that, seemingly, most of those who are at all acquainted with machines must be employed in and by machine tool organizations and that customers' shops must be operated by a lot of noble red-men rather than by machine age men.

"A perfectly normal contrary view is that, if 'master tools of industry' are bought by master users of such tools, as is implied by industry's position in the machine age, there should be a sufficiently close mutuality of language and understanding between makers and users to obviate any prime necessity for the protracted interpreter-expense involved in the existing system of putting a new machine to work.

"Since it is well established that an 80-lb. girl can give the operating care necessary for handling a 120-hp. automobile or a 400-hp. aeroplane, it seems reasonable for me to opine that most modern machine tools, upon arrival at customers' shops, might be set up and put to work without protracted spoon-feeding. Also, but possibly a little far-fetched, since dairymen have learned how to take calves away from the mother within 24 hours, cooperative study might effect a condition whereby machine tools could be weaned in about the same length of time. Nor would the gain thereby all accrue to the machine tool builder.

"I recall that a motorcycle manufacturer found this striking difference between his far-away export market and his domestic market. In export markets, the users took a sympathetic and respectful attitude toward a machine when they unboxed it. They took time in studying the parts, in reading the book of instructions, and in easing the machine into operation. On the other hand, to all intents and purposes, the domestic users filled up the tank, stepped on 'some damned thing' which looked as if

it might be a starter, twisted or kicked some rod, and then notified the dealer or manufacturer that the machine would not run. I hope that some distributors will appreciate this simile.

"Emerson has said that every man is as lazy as he dares be. If machine tool makers have sanctioned the development of a lot of lazy customers or customer employees, they have no one to blame but themselves. I say this because I am thoroughly familiar with the growth of the demonstrator service over a period of years. Why sellers are so afraid to charge, say a nominal \$25 per day for the services of a man to start the user off, if and when requested, is beyond me. They seem to prefer the more theatrical demonstrator-method of making a machine 'stick'. Too much of the demonstrator service is for the purpose of proving a production contention, rather than for training an operator—'look at the mikes—two-tenths of a thousandth'. To this, the shop comeback is a suspicious—'let's see you keep it up'. So, to prove it, the demonstrator, working for the machines' papa, spends additional days or weeks while the operator absorbs whatever he can. This may be denied, but I have seen the show too many times to be mistaken.

"On the other hand, if many customers are so shortsighted as to lean on demonstrators instead of on men to whom they pay good wages and from whom they expect machine production, that's a fault of theirs for which they, too, ultimately pay—machines down, new operators, additional demonstrations because of new operators, lost production and what have you. Yet I suppose that if they want to waste man-hours just because a purchasing agreement permits them to do so, it's their business, but in so doing they do not add to the proficiency of their operating organizations nor do they help reduce the abuse which features gratuitous service of any kind, even though its cost, supposedly, may be included in selling price.

"The machine tool dealer is very much in this picture too. If he is chump enough to accept costly responsibility as a 'prove-it' and a 'there's-something-the-matter-with-the-machine' intermediary, he has no one to blame but himself. He is, admittedly, in a difficult position because of the general abuse on both sides of him, but he is nevertheless an active participant in a poorly executed sales scheme.

"In connection with these observations, it may be of course, that I am the one who has held

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If your steel problem is one of machinability, exactness to size, straightness, tensile strength or any other combination of physical characteristics, let Wyckoff be your metallurgist in the selection of your special steels.

Take advantage of their many years of intensive specialization in meeting industry's most difficult steel requirements plus the unexcelled production facilities of two large plants devoted exclusively to the manufacture of cold drawn steels for every purpose.

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General Offices: First National Bank Bldg., Pittsburgh, Pa.
Mills at Ambridge, Pa. and Chicago, Ill.
Manufacturers of Cold Drawn Steels

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the baby too long. However, I can see no ground for letting the practice grow for it will not become any less expensive as time goes on. In any continuance I can see only ultimate higher prices for machines, and this certainly will not be a cause of more or better-made machine sales."

The Machinery Club of Chicago has been reorganized and will occupy its new club rooms on the ground floor of the Machinery Sales Building, Washington and Jefferson Streets, about Aug. 1.

Heavy Vote in Steel Corporation Primaries

PRIMARY elections under the Employee representation plan have been held among more than half of the employees of the United States Steel Corp., including employees of the Carnegie Steel Co., the American Sheet & Tin Plate Co. and the ore mines on the Upper Lakes iron ranges. Close to 90 per cent of all eligible employees voted in these primaries and in no case was a non-employee nominated for office.

Non-Ferrous Metal Prices Are Held Despite Lack of Consumer Interest

Copper Producers Agree to Maintain Standards Set Up Under Code—
Lead Prices Firm As Zinc Regains Five-Point Loss—Tin Quiet

NEW YORK, June 18.—The United States Copper Assn., representing all the producers and custom smelters of copper in the United States, met here yesterday and agreed that the association should take up the functions of the former code authority in connection with the liquidation of its unfinished business. The association also resolved to cooperate in maintaining existing standards and practices insofar as it might be legal and proper and appointed a committee to study the extent of such possible activity. In the meantime, the domestic copper market has remained firm at 9c. a lb., delivered Connecticut Valley, despite continued weakness abroad and al-

most complete lack of consumer interest in this country. The price at London this morning had dropped as low as 7.65c. a lb., usual Continental base ports, a decline of almost a full cent a pound from the high reached just before the death of the NRA. Total copper sales in the first two weeks of the month have amounted to less than 6700 tons, but consumption is not believed to have declined appreciably, and buying will likely be resumed as soon as the market situation is clarified.

Tin

The tin market has remained very dull during the past week, despite the fact that prices have

been steadily below the cost of importation. The International committee, meeting last Wednesday, announced an increase in quotas of only 5 per cent, which was about in line with the expectations of the trade. In London a sharp disparity between quotations on spot and future metal has developed, the spread now standing at about £12. Declining tin plate operations in this country have not helped the situation, although some improvement is expected when the present heavy stocks of mills have been eased somewhat. Straits metal was quotable in New York today at 51c. a lb., while the London price was £236 10s. Standard tin was quoted in London at £228 10s. for spot and £216 5s. for futures, while the market in the East was £230 10s.

Lead

Buying has been resumed on a moderate scale and the market is again well established at 3.85c., St. Louis, and 4c., New York. The leading interest is not an active factor in the market with its quotations \$2 a ton above the general level. New business is sufficient to enable custom smelters to balance their intake and outgo fairly well. The ore market also has a firmer undertone, recent prices having averaged \$36 to \$40 a ton.

Zinc

Following a single day of weakness last Tuesday, the market regained its former strength and has since been quotable at 4.30c., East St. Louis, and 4.67½c., New York. Sales, however, have been very light, having amounted to only about 700 tons last week. A favorable factor was a drop of 3365 tons in undelivered sales during the week. Higher prices for concentrates had considerable influence in strengthening the market. Sales were made on Saturday at \$27 a ton for flotation and \$28 for mill grades, representing increases of \$2 a ton over recent levels. Production last week totaled about 5100 tons, compared with sales of 7650 tons and shipments of 3900 tons.

Ingot Brass and Bronze

Combined shipments of ingot brass and bronze during April, as reported by 35 companies engaged in that industry, were 5698 tons, compared with 5014 tons during March.

A new band saw, No. 217, has been designed for engineering plants, pattern shops and production factories by Oliver Machinery Co., Grand Rapids, Mich. During the past two years these saws have been supplied on many Government specifications and are now given a wide trade offering.

The Week's Prices. Cents Per Pound for Early Delivery

	June 12	June 13	June 14	June 15	June 17	June 18
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, spot, New York	50.75	51.25	51.25	51.25	50.75	51.00
Zinc, East St. Louis	4.30	4.30	4.30	4.30	4.30	4.30
Zinc, New York†	4.67½	4.67½	4.67½	4.67½	4.67½	4.67½
Lead, St. Louis	3.85	3.85	3.85	3.85	3.85	3.85
Lead, New York	4.00	4.00	4.00	4.00	4.00	4.00

*Refinery quotations; price ¼c. higher delivered in Connecticut.

†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19c. to 21c. a lb., delivered.
Aluminum, No. 12 remelt, No. 2 standard, in carloads, 16.25c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 12.75c. a lb., New York.
Brass ingots, commercial 85-5-5-5, 8c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.	
Tin, Straits pig	52.25c. to 53.25c.
Tin, bar	54.25c. to 55.25c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.00c.
*Seamless copper tubes	16.25c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.60c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.75c.
Antimony, Asiatic	13.50c. to 14.50c.
Alum. virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	29.50 to 30.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.	
Tin, Straits pig	55.25c.
Tin, bar	57.25c.

Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slabs	5.75c. to 6.00c.
Lead, American pig	4.65c. to 5.40c.
Lead, bar	8.00c.
Antimony, Asiatic	15.75c.
Babbitt metal, medium grade	19.25c.
Babbitt metal, high grade	59.25c.
Solder, ½ and ½	32.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy, crucible	6.00c.	6.75c.
Copper, hvy, and wire	5.87½c.	6.37½c.
Copper, light and bottoms	4.87½c.	5.37½c.
Brass, heavy	3.25c.	3.87½c.
Brass, light	2.50c.	3.25c.
Hvy. machine composition	4.87½c.	5.37½c.
No. 1 yel. brass turnings	4.25c.	4.75c.
No. 1 red brass or compos. turnings	4.50c.	5.00c.
Lead, heavy	2.87½c.	3.25c.
Zinc	2.25c.	2.62½c.
Cast aluminum	10.62½c.	11.75c.
Sheet aluminum	12.00c.	13.50c.

Blue Eagle Was Dead Before Court Signed Death Warrant

(CONTINUED FROM PAGE 31)

capitated strike after strike. Like many other theories of social reformers, the philosophy underlying Section 7-a is based on a part-truth and illustrates with great force the danger of trying to make a generalization fit the wide variations in industrial relations that one finds in a nation so vast as the United States.

I will not deny that, among certain groups of employers, there has been, and perhaps still is, exploitation of labor. But I do deny that such a relationship between employer and employee is typical.

In many industries, and particularly in the great steel and metal-working industries served by my publication, the relations between men and management were marked by unbroken cordiality up to the time of the passage of the recovery act. If a spirit of class conflict had ever existed it had long since been forgotten. Company and men had come to realize the mutuality of their interests. Most employers in this field have long espoused the high-wage theory, knowing only too well American industry's dependence on mass markets. During the course of the depression they reduced wage rates only as a last resort and spread available work as widely as possible to minimize distress among their men. By their deeds, rather than by their professions, they earned the respect and good will of their employees.

Cloistered Intellectuals Cling to Theory of Class Conflict

Into this tranquil situation the recovery program introduced the ferment of discontent. Hundreds of paid union organizers marched out into the highways and byways and with wile and gile, reinforced by misrepresentation as to the intent of Section 7-a, poisoned the minds of the workmen against their employers and incited them to plunge into class warfare. This campaign of class hatred was undertaken in the name of recovery. What a travesty! Its real purpose, obvious to all disinterested parties, was to build up a huge union organization and thereby to yield fat jobs and tremendous power to a professional parasitical class.

Yet the cloistered intellectuals of this country, still powerful in the councils of the Government and most articulate in the press

and on the radio, refuse, in their theoretical intemperance, to recognize so self-evident a truth. They visualize all industry as an expanded sweatshop. They believe the class struggle is not only necessary but inevitable. Why? Well, for one thing, they read it in learned books imported from abroad. The depression, they say, was the result of the breakdown of private enterprise. The laboring class must get a larger share of the fruits of production or other breakdowns, even more disastrous, will occur in the future.

Suppression of Labor Did Not Cause Depression

Let us examine these premises. Col. Leonard P. Ayres has demonstrated beyond dispute that the major cause of this depression, as of the other great depressions of our history, was war. The depressions following the Napoleonic wars, the civil war and the world war have all had similar patterns. Each war was followed by a primary depression and a longer secondary depression. We are now in the secondary phase of the economic reaction to the world war.

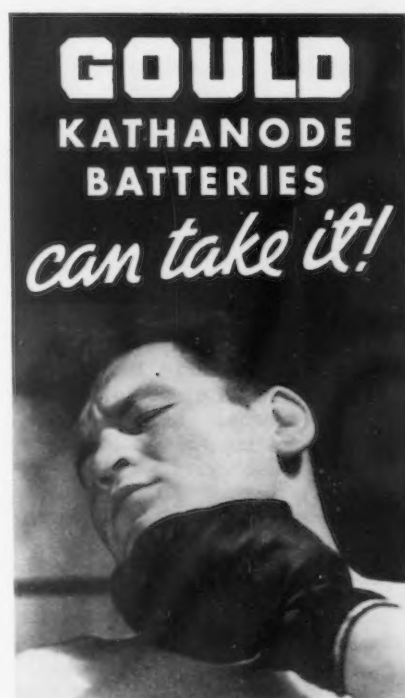
Now let us examine the claim that labor did not get its share of national income. A study of this subject in the recent report of the Brookings Institution on "America's Capacity to Consume" discloses that from 1909 to 1929 labor's share steadily increased. In 1909, 54 per cent of the national income went to employees. In 1929, employees received 65 per cent.

The Machine, Not Class Conflict, Has Raised Wage Standards

Envy of the wealthy has existed since the beginning of time, and struggles to take away the wealth of others provide most of the material from which history is made. But such strife has held back human progress and, in too many cases, has penalized both victor and vanquished. The real key to recovery and to prosperity is not the class struggle but the machine, or if you prefer a broader term, applied science. The lot of man in general and of the workman in particular has improved in direct proportion to man's conquest of natural laws.

To be sure, as man's technique in production advances, older methods of doing things become

passé and there is a temporary suffering both among men who are thrown out of jobs and among companies that lose their markets. But technological unemployment is a drop in the bucket compared with the new employment that is created by improvement and extension of the machine. The National Industrial Conference Board has shown that there were 72,000 wage-earners in manufacturing per million inhabitants in 1929, as compared with 49,000 per million in 1879. Of the 23,000, represent-



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ing the increase over 1879, two out of every five wage-earners were employed by industries that did not exist in 1879. In other words, nearly three million wage-earners would have been without employment if invention and science had not created jobs for them.

The list of new industries that have sprung from invention since 1879 is a long one. It will suffice to mention a few of them. At the head of the list as a provider of employment is the manufacture of electrical machinery and supplies. Then we find the automobile industry, the rubber tire industry, the manufacture of gasoline, the production of rayon and allied products, the manufacture of artificial ice, the aluminum industry, the manufacture of typewriters, the mechanical refrigerator industry, the cash register and computing machine industry, the aircraft industry, radio and phonograph manufacture, the motion picture industry.

And invention is not at an end. New products and new methods of making products are constantly being developed and will appear on the scene in great numbers as soon as business confidence is restored and capital comes out of hiding. Nothing will restore confidence more quickly than complete abandonment of bureaucratic meddling with business, and especially with industrial relations. It is time to stop preaching class struggle. It is time to stop crying "share the wealth" and join hands in producing wealth. The world has made its most rapid strides in spreading wealth and raising living standards when free enterprise and invention have combined in attacking the production problem. That partnership, if relieved of interference, will again get into full swing and raise production and consumption to new heights.

Stagnation will be our lot if we socialize and divide existing wealth. Progress and prosperity can be won if we stop worrying about the other fellow's wealth and buckle down to the job of creating new wealth. Private enterprise and private capital are at hand waiting to help us do that job.

The Ingersoll Milling Machine Co., Rockford, Ill., announces side-milling cutters in the company's new zee-lock type, in the design of which inserted blades are retained in the cutter housing by a z-shaped wedge. The wedge hooks the front of the cutter body and the back of the blade. Cutters are made as small as 4 in. diameter by ½ in. wide.

PERSONALS

J. K. BAYLIS, acting manager of sales at Buffalo for the Bethlehem Steel Co., has been appointed manager of sales of the Buffalo district. He became identified with the steel industry upon leaving college, and before joining the Bethlehem organization was engaged in sales work for the Carnegie Steel Co., Midvale Steel &

Science from that institution in 1920. Later he was appointed research assistant to Prof. C. A. Edwards, University College, Swansea, University of Wales. From 1922 to 1931, Mr. Murphy was a scientific assistant in the metallurgical department of the famous British institution, the National Physical Laboratory. In 1931 he resigned from



J. K. BAYLIS



R. W. KEMPSMITH



A. J. MURPHY

Ordinance Co., and Donner Steel Co. He has been with the Bethlehem company since April 1, 1927.

♦ ♦ ♦

R. W. KEMPSMITH, who has been identified with the Bethlehem Steel Co. since 1915, has been appointed assistant manager of sales at Cleveland, having been connected with the sales office in that city since 1919. Mr. Kemp Smith was born in Bethlehem and was graduated from Lehigh University in 1911. Before his association with Bethlehem, he was connected with the United Gas Improvement Co., Link Belt Engineering Co. and American Foundry & Construction Co.

♦ ♦ ♦

A. J. MURPHY, British metallurgist, will present the 1935 official exchange paper of the Institute of British Foundrymen, at the American Foundrymen's Association convention, which will be held Aug. 20 to 23, at Toronto, Canada. Mr. Murphy is chief metallurgist for J. Stone & Co., Ltd., engineers and founders of Deptford, London. A graduate with first class honors of the University of Manchester, he received the degree of Master of

N. P. L. to accept his present position with J. Stone & Co.

Mr. Murphy is noted as the author and co-author of many papers before the Royal Society, Royal Microscopical Society, Institute of Metals, and the Institution of Mechanical Engineers. These papers have covered a wide variety of research work on copper-aluminum-nickel alloys, copper-phosphorus, alloys of silver, amalgams, metallography at low temperatures, wrought iron, iron chains, cracking of boiler plates, and bearing metals.

♦ ♦ ♦

CHARLES W. DANIELS, who has been connected with the Harnischfeger Corp., Milwaukee, for many years, has been appointed general sales manager. He was identified with the New York office for several years, but most recently was in charge of the corporation's Philadelphia office. He is being succeeded in Philadelphia by L. M. STOUT.

♦ ♦ ♦

E. D. WACKER, for the past 11 years with the C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., has been made assistant general sales manager.

During that time he served as manager of the Pittsburgh territory and more recently as division sales manager in charge of Snapon controller sales for domestic refrigerators. The controller division will be in charge of R. A. SKINNER.

D. A. BAILEY has been appointed general superintendent of the Judson Steel Corp., Oakland, Cal., succeeding the late Nicholas Becker.

THOMAS F. SLATTERY, of the United States Bureau of Engraving and Printing, has been elected president of the American Electro-Platers' Society. Others officers elected at the recent twenty-third annual convention of the Society at Bridgeport, included: First vice-president, JOSEPH E. UNDERWOOD of the C. H. Hunt Pen Co., Philadelphia; second vice-president, PATRICK SHEEHAN, Cutler-Hammer Co., Milwaukee; secretary-treasurer, E. STEEN THOMPSON, Hayes Mfg. Co., Erie; editor, W. J. R. KENNEDY, Westinghouse Electric & Mfg. Co., Springfield, Mass.

WALTER L. TANN, for the past eight years executive engineer for Peter Clark, Inc., New York, has joined the staff of the engineering department of the Farrell-Birmingham Co., Inc., Ansonia, Conn. He received his engineering education in the Student Engineers' School of the American Locomotive Co.

GEORGE S. WHYTE, president of the MacWhyte Co., Kenosha, Wis., wire rope and cable, was reelected president of the Wisconsin Manufacturers Association for a fourth term at the annual meeting in Milwaukee on June 11. D. C. EVEREST, Wausau, was reelected vice-president, and S. G. SCANLAN, president of the Scanlan-Morris Co., Madison, treasurer. GEORGE F. KULL, Madison, was reappointed secretary-manager. GEN. OTTO H. FALK, chairman of the board, Allis-Chalmers Mfg. Co., Milwaukee, and F. H. CLAUSEN, president of the Van Brunt Mfg. Co., Horicon, were reelected members of the executive committee to serve with the officers. EARL H. MCCARTY, president of Nash Motors Co., Kenosha, was elected a director to fill the unexpired term of JAMES L. WILSON, formerly of Nash Motors Co., who resigned.

CARL GALLAUER, vice-president of the Moise Steel Co., Milwaukee, jobber of sheet steel, was one of two citizens of Milwaukee honored by Marquette University, at the annual commencement exercises on

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June 12, with awards of certificates of distinctive service. The citation refers to Mr. Gallauer's "stimulating leadership" as general chairman of the 1934 Milwaukee Community Fund campaign, when more than \$900,000 was raised despite economic obstacles.

F. E. GARDNER, associated with the Gardner Machine Co., Beloit, Wis., for 30 years, has resigned as vice-president and a member of the board of directors. He is succeeded by W. B. LEISHMAN, with the company 22 years, and most recently secretary. L. WALDO THOMPSON is president.

M. B. HENDERSON, formerly in charge of engineering and furnace design for the Arthur L. Stevens Corp., Chicago, is now handling all routine affairs of the corporation. The business will be carried on by the personnel which had been identified with the late Mr. Stevens.

J. G. CARRUTHERS has resigned as vice-president of the Otis Steel Co., Cleveland, effective at once. Mr. Carruthers became affiliated with the company in 1922 as general manager of sales and about 10 years ago was made vice-president in charge of sales. PAUL B. ALLEN, who had been Detroit district sales manager of the Otis company, was named a few weeks ago to succeed Mr. Carruthers as general manager of sales. Previ-

ous to his affiliation with the Otis company, Mr. Carruthers was connected for 18 years with the sales organizations of the Carnegie Steel Co. and Illinois Steel Co.

FRANK J. TONE, president, Carborundum Co., was awarded the honorary degree of Doctor of Science, by the University of Pittsburgh at the commencement exercises on June 5.

O. W. McMULLAN, formerly chief metallurgist at the Timken-Detroit Axle Co., Detroit, has been added to the research staff of the International Nickel Co., Inc., New York. He will be located in the research laboratory of the company at Bayonne, N. J. HAROLD L. GEIGER has become identified with the field staff of the development and research department of the company. He was formerly with the operating and metallurgical departments of the Inland Steel Co. and since 1929 chief metallurgist of the Wisconsin Steel Co. For a few months, Mr. Geiger will operate out of the Detroit office of the company located in the General Motors Building.

E. J. McDONNELL has been appointed vice-president of the industrial division of Blaw-Knox Co., Blawnox, Pa. L. A. PRESCOTT has been made vice-president of the company's engineering division.

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tion required to bonderize a given amount of work.

The bonderizing equipment is assembled in a steel housing with reservoirs below, where solutions are accumulated ready for circulation. As the work progresses on the conveyor line through the various steps, it passes a series of small standpipe sprays which force the solution against the material from every angle, flooding all areas to be treated. All pumps, valves, pipes, tanks, motors and similar equipment are standard and need not be made from expensive alloys.

Equipment for Spra-Bonderizing may be adapted to production of almost any size or volume. Spraying speeds up operations and produces a hard, compact, clean coating which, in addition to being a rust-inhibitor, has a natural affinity for paint finishes.

Metal Cleaning Processing Includes Bonderizing

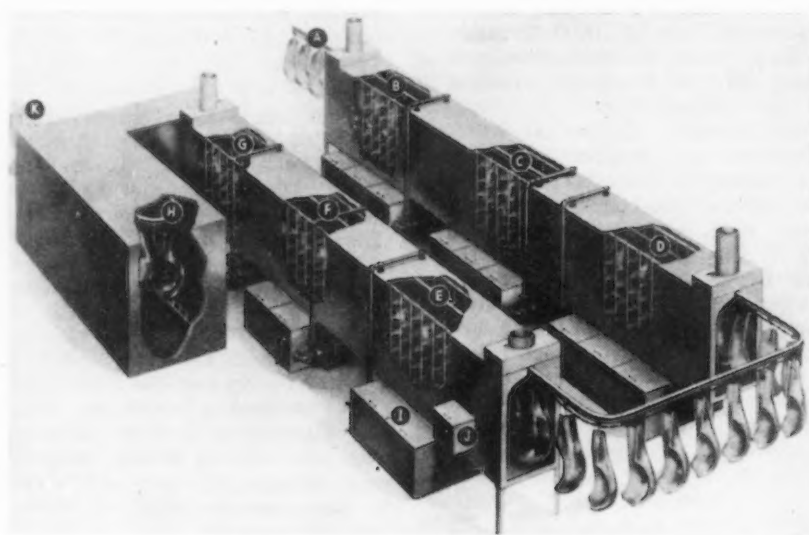
A RUST-RESISTANT phosphate coating, providing an adherent base on iron and steel for paint, enamel or lacquer, is now being applied automatically by a spraying process known as "Spra-Bonderizing." The process, developed by the Parker Rust-Proof Co., Detroit, consists of spraying the solution onto work as it passes through the bonderizing section of a completely mechanized conveyor line, including cleaning, bonderizing, rinsing and drying.

Heretofore bonderizing has been done only by the immersion method in still tanks, either by submerging the work on racks or by passing the work to be processed through a large tank on a conveyor, the material being in the solution from 2 to 5 min. Spra-Bonderizing makes possible production of phosphate coatings at lower temperatures and lower chemical concentration than has been possible by the immersion process. Processing time is reduced to 60 sec. The pressure spraying accelerates the chemical reaction and produces a cleaning and coating action in one operation.

On account of the shortened

processing time, the equipment necessary is minimized, the amount of steam needed is less, and smaller floor space is required. Recirculation reduces the volume of solu-

STANDARDIZATION activities of the Society of Automotive Engineers are outlined in a nine-page report prepared by C. W. Spicer, chairman of the society's standards committee, for inclusion in the comprehensive 1935 edition of the S.A.E. Handbook. Standards for product comprise six divisions, one of the largest of which is iron and steel and other materials, and standards for production equipment, covering tools and methods and practices, comprise two divisions. General policy and procedure are outlined, and the various standards and recommended practices are listed in detail.



THE illustration shows a Spra-Bonderizing installation, from cleaning to drying. The work enters the cleaning section at A, goes through an alkaline cleaning at B, is given a rinse at C and D, passes through the Spra-Bonderizing section at E. F is a clear water rinse and G an acidified rinse, which are followed by passage through the drying oven H. The work leaves the drying oven at K ready for the final finish. The tank I is for the bonderizing solution and the tank J for replenishing the solution.

Europe Is Growing

Market For

Specialized

American Tools

EUROPEAN automotive plants have been rapidly developing during the past year into major outlets for many specialized machine tools built in the United States, according to J. D. Rovick, Michigan Tool Co., Detroit, who has returned from an 18-months' stay abroad.

The high degree of flexibility and the consistent accuracy now built into American tools is one of the chief reasons for this trend. Again, increased tariffs have militated against the purchase in Europe of the more standardized types of American machines. In Europe there is a growing demand for production accuracy and quality, declares Mr. Rovick, but machine tool companies abroad have not adapted themselves to the changing situation. They still build "machine tools" rather than "production equipment." Lacking a demand for high production machinery, they have not attempted intensive development work along specialized lines that made mass production possible in this country.

In Europe, for example, a widespread demand has arisen for quieter transmission gears in automobiles. It is one thing, however, as Mr. Rovick points out, to design a quiet transmission and another to build it in quantities with the accuracies and quality required to insure quiet operation. Since European machine tool manufacturers could not afford the development program necessary, car builders turned to the United States for such specialized equipment as gear finishing and lapping machines and production checking devices. Such equipment has reduced European car manufacturing costs. It makes change-over simple from one car model to the next and from gear type to gear type. Whereas American producers desire flexibility mainly from the standpoint of design change, European manufacturers use that flexibility in actual production.

Mr. Rovick states that such specialized equipment has brought

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about important reductions in small tool costs in European plants. Being originally designed for mass production, this equipment requires a tooling capable of long runs without resharpening. Lacking the trained personnel and equipment for reconditioning of tools, European manufacturers are actually shipping to the United States for reconditioning the more important and complicated tooling. This is made possible by the long runs with specialized equipment.

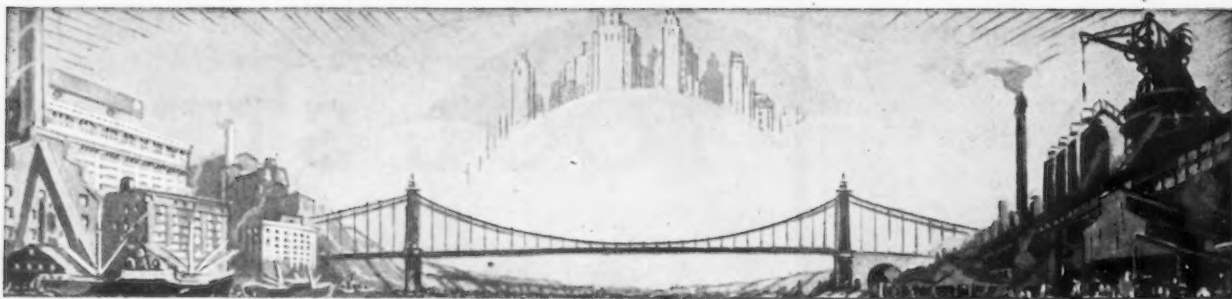
Public Building Contracts Held Up

WASHINGTON, June 11.—Secretary of the Treasury Morgenthau stated two weeks ago that contracts for Federal public buildings are being held up while study is being made of the effect of the Supreme Court's NRA decision invalidating codes. The study is being made by Admiral Christian J. Peoples, chief of the procurement division, and Herman Oliphant, general counsel of the Treasury Department.

There is also involved the question of wages paid labor on public buildings. Under the PWA the "prevailing wage" was paid but

under the NRA codes specific wages were provided for as set forth in the codes. The assumption is that the "prevailing wage" will be restored under the new program. It can be established by the President under provisions of the \$4,000,000,000 works-relief act which recently was enacted. Organized labor has been insistent in its demand for the prevailing wage, or the wage generally paid for like labor in the community in which the work is done.

Meanwhile, the Division of Applications and Information of the Works-Relief Administration continues to announce applications for allotments under the \$4,000,000,000 fund. Among them are five construction projects of the Veterans' Administration calling for an aggregate of \$4,726,000. They are located in Arizona, New Jersey and New York. At Whipple, Ariz., the complete overhauling of a veterans' hospital is proposed at a cost of \$676,000. The Interior Department through the Reclamation Service has asked for an allotment of \$10,000,000 for the Casper-Alcova project for which the PWA originally granted an allotment of \$22,700,000. The Navy Department has submitted applications for naval base construction projects in California, Connecticut, District of Columbia, Massachusetts, South Carolina and Virginia, the aggregate amount requested being \$1,464,300.



Plant Expansion and Equipment Buying

Automotive Tool Buying More Active; Lathe Prices Are Generally Advanced

THE machine tool market is rather less active, although a seasonal lull was expected at this time. However, automobile companies are still buying machinery and equipment, and their purchases are likely to be continued for some time. General Motors subsidiaries are most active and Studebaker has been in the market.

Prices on lathes are being marked up 12½ to 15 per cent and turret lathes are being advanced 8 to 10 per cent. Practically all makers are announcing these changes which are designed to compensate for increased production costs that have been absorbed for more than a year. The industry is also anxious to maintain the higher wage standards set up under NRA, and higher selling prices seem to offer the only way.

◀ BUFFALO DISTRICT ▶

Luminite Products Corp., Salamanca, N. Y., manufacturer of special castings, printers' rollers and kindred specialties, has let general contract to Benz Engineering Co., 33 Main Street, for one-story addition. Cost close to \$35,000 with equipment.

Carborundum Co., Niagara Falls, N. Y., manufacturer of grinding wheels and other abrasive products, has taken out permit for three-story addition, 75 x 80 ft., in part for storage and distribution. Cost close to \$85,000 with equipment.

Board of Public Utilities, City Hall, Jamestown, N. Y., plans extensions and improvements in municipal electric light and power plant. Cost over \$50,000 with equipment. Peter F. Loftus, Oliver Building, Pittsburgh, is consulting engineer. C. O. Johnson is superintendent at plant.

◀ NORTH ATLANTIC ▶

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 28 for magnet wire for Brooklyn Navy Yard (Schedule 6358); until July 9, turbo-generator sets, switchboards and spare parts for Brooklyn and Philadelphia yards (Schedule 5362).

Cadillac Motor Car Co., 70 Columbus Avenue, New York, has leased 10-story building at 521-31 West Fifty-seventh Street, about 300,000 sq. ft. floor space, for new service, repair and parts headquarters for Cadillac and LaSalle automobiles.

Union Bag & Paper Corp., Woolworth Building, New York, is arranging new stock issue totaling \$1,460,760 to be used as part of fund for new pulp and paper mill

and paper converting plant at Hermitage Plantation, Savannah, Ga. Contract has been let to Merritt-Chapman & Scott Corp., 17 Battery Place, New York, for water-front work at plant site, dredging and land reclamation for mill units. Entire project will cost \$4,000,000 with machinery. George F. Hardy, 309 Broadway, New York, is consulting engineer.

Village Council, Horseheads, N. Y., plans new municipal electric light and power plant. Cost about \$100,000 with equipment. H. E. Childs, Sayre, Pa., is consulting engineer.

Superintendent, Army Transport Service, Army Base, Brooklyn, asks bids until June 28 for metal life boats and equipment (Circular 64).

Signal Supply Officer, Army Base, Brooklyn, asks bids until June 28 for wire, in lots of 500 to 1999 miles (Circular 158); plugs, sockets and other supplies (Circular 148); until July 10, for radio transmitting equipment (Circular 164).

Board of Education, Catskill, N. Y., plans manual training department in new multi-story high school, for which bids will be asked on general contract during summer. Cost about \$275,000. E. Sibley, South Street, is architect.

Wyoming Valley Paper Mill, 5 Beekman Street, New York, with mill at Northumberland, N. H., has purchased former plant of Oswegatchie Paper Co., Inc., Natural Dam, near Gouverneur, N. Y., and will remodel for new mill for manufacture of tissue and kindred paper stocks.

E. I. duPont de Nemours & Co., duPont Building, Wilmington, Del., plans rebuilding part of ethyl lead gasoline distilling plant at Deepwater, N. J., recently destroyed by fire. Loss about \$50,000 with equipment.

Board of Education, Municipal Building, Lyndhurst, N. J., asks bids until June 25

for manual training supplies and equipment for school year 1935-36.

Signal Property Officer, Signal Corps Laboratories, Fort Monmouth, Oceanport, N. J., asks bids until June 24 for telescoping mast antennas in lots of 20 to 40, radio transmitters, etc. (Circular 10).

Gwilliam Mfg. & Supply Co., York Street, Philadelphia, manufacturer of pipe fittings, bushings and kindred products, has leased one-story building at 4417-55 North Sixth Street, totaling about 20,000 sq. ft. floor space, with 15,000 sq. ft. land adjoining for new plant.

Palmyra School District, Palmyra, Pa., plans manual training department in new multi-story junior and senior high school. Cost about \$250,000. Financing has been arranged through Federal aid. Gondos & Gondos, Architects Building, Philadelphia, are architects.

◀ SOUTH ATLANTIC ▶

District Quartermaster, District 1, CCC, Custom House Wharf, Charleston, S. C., asks bids until June 24 for hot water storage tanks, galvanized iron pipe, valves, hot water heaters and other equipment (Circular 28).

City Council, Savannah, Ga., has authorized plans for new municipal abattoir, meat packing and cold storage plant. Cost about \$250,000 with equipment. Menges-Mange, Inc., 1515 North Grand Street, St. Louis, is engineer. W. D. Garvin, Jr., is superintendent of municipal abattoir department.

Southern States Iron Roofing Co., Savannah, Ga., has plans for plant addition and improvements. Cost about \$45,000 with equipment.

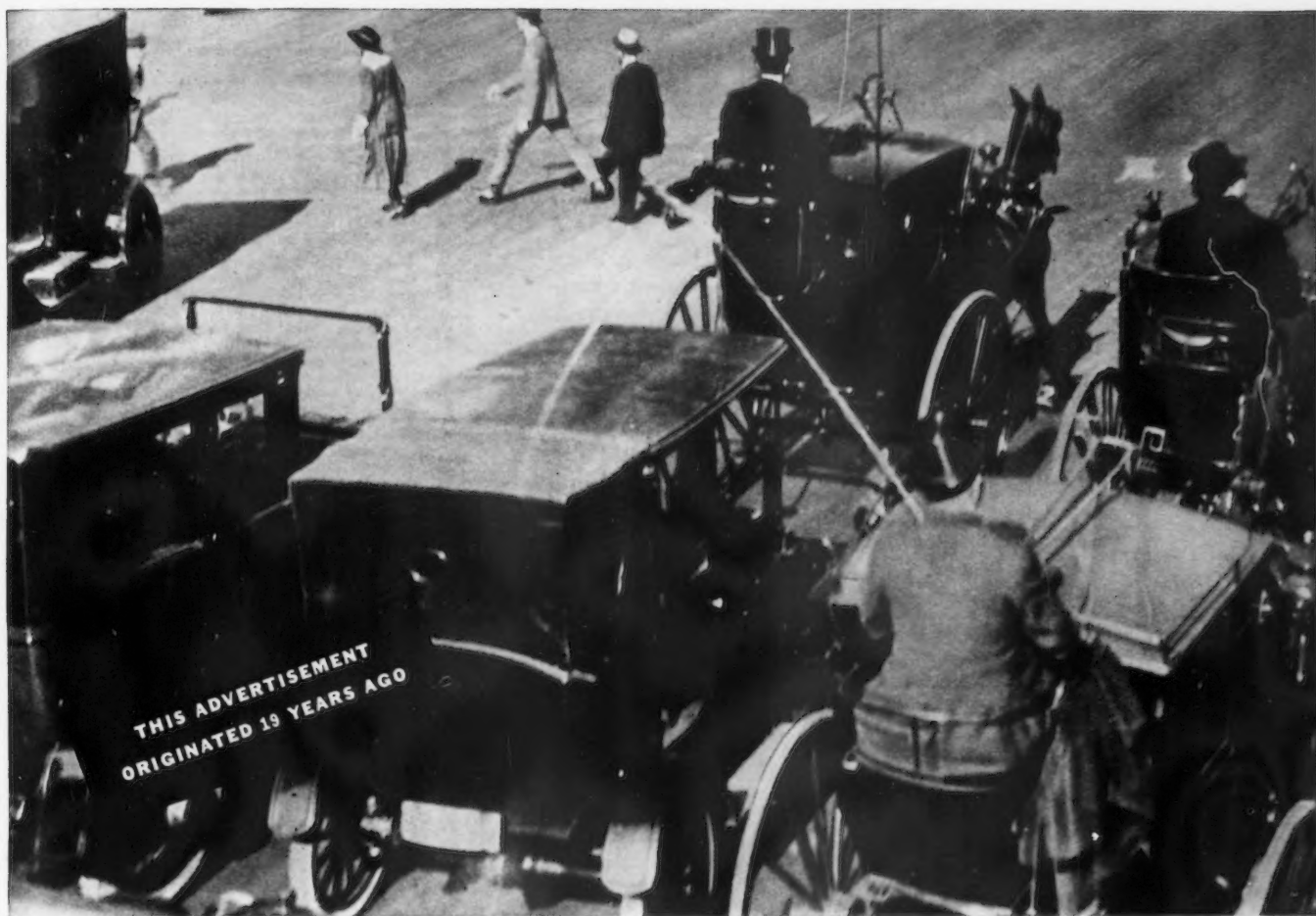
City Council, Durham, N. C., R. W. Flack, city manager, plans installation of 1,500,000 gal. elevated steel tank and tower for municipal water department. Cost over \$100,000.

City Council, Danville, Va., has secured PWA loan of \$2,750,000 for municipal hydroelectric generating plant on Dan River and transmission line to city, including substations and other distributing facilities. Special election will be called to vote approval of project. E. C. Brantley is manager of water, gas and electric department.

◀ NEW ENGLAND ▶

Wiremold Co., Railroad Street, Elmwood, Hartford, Conn., manufacturer of wire and cable, conduits, etc., has let general contract to R. F. Jones Co., 15 Lewis Street, for two additions, one three-stories, 90 x 138 ft., for general manufacturing, and other two-stories, 60 x 70 ft., for general operations and office service. Cost close to \$100,000 with equipment. Greenwood & Noerr, 525 Main Street, are consulting engineers.

Department of Public Institutions, State House, Augusta, Me., plans extensions and



WHEN AIR CONDITIONING MADE MATCH MAKING POSSIBLE IN HOT WEATHER

In the sweltering heat of midsummer 1916, many a citizen of Wadsworth, Ohio, cocked his eye towards the match plant and exclaimed—"Well, I'll be hanged, the match plant is still working. Something strange. Never heard of it in hot weather!"

Some old-timers had "their doubts." Others said, "it wouldn't last."

The fact remains, American Blower Individually Engineered Air Conditioning installed in the Ohio Match Company's plant 19 years ago made it possible, for the first time in the company's history, to produce matches during hot weather.

Since 1916, the Ohio Match Company has produced many billion boxes of matches regardless of weather. Numerous additions equipped with American Blower Air Conditioning have been added to the plant. The original Air Conditioning pioneered by American Blower, long before most people knew that such a thing existed, is still giving satisfactory service.

To countless other industries and processes of all types and descriptions, American Blower has applied Individually Engineered Air Conditioning.

If you have an air conditioning problem or one that requires equipment for mechanical draft, heating, ventilating,

cooling, or just air handling, American Blower Engineers will gladly cooperate with your architect or consulting engineer in the design and manufacture of equipment to meet your specific needs and conditions.

American Blower's more than fifty years' experience assures the proper knowledge, products and data to enable you to get a better job—a more satisfactory and a more economical job.

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Laid Out and Specified by Leading Architects and Consulting Engineers . . . Designed and Manufactured by American Blower . . . Installed by Responsible Contractors Everywhere.

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Which Type Of PERMITE Aluminum Alloy Casting Best Fills Your Specific Needs?

PERMANENT MOLD

All Permite Aluminum Alloy Castings bring a new lightness of weight, improvement in appearance and increase in efficiency to the products in which they are used. But each type is adaptable to a specific need.

Permite Permanent Mold Castings are the most reliable from the standpoint of uniformity, fine grain structure and dimensional accuracy. Close dimensional accuracy eliminates the necessity of machine finishing on some surfaces, and reduces it to a minimum on others—thereby drastically lowering machining costs.

SEMI- PERMANENT MOLD

Permite Semi-Permanent Mold Castings are used where the interior of the casting is of such intricate design as to prevent the removal of metal cores. The exterior of this casting is made in a metal mold, giving to the surface the same exceptional qualities as possessed by the Permanent Mold Casting.

SAND CAST

Sand Castings are used where small quantities are required, permitting only a minimum pattern charge, or where maximum strength and soundness are not required. In many cases, they form the first step in experiments, later to be converted into semi-permanent or full permanent mold castings.

Our engineers will be glad to advise you which type of Permite Castings will best meet your needs. Send us your blue-prints for recommendations and quotations.

ALUMINUM INDUSTRIES, INC., Cincinnati, O.

PERMITE CASTINGS

Permanent Mold ★ Semi-Permanent Mold ★ Sand Cast

improvements in steam power plant at institution at Bangor, Me. Cost about \$40,000 with equipment. Fels Co., 42 Union Street, Portland, Me., is consulting engineer.

Wallingford Steel Co., Valley Street, Wallingford, Conn., plans one-story addition. Cost over \$50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 25 for 225 seamless steel shells, and 225 steel shells, rolled and brazed or welded, for Newport, R. I., naval station (Schedule 5349).

Aerodynamic Boat Corp., Milford, Conn., has been organized, capital \$200,000, to manufacture flying boats, parts and kindred marine equipment. Company is headed by Thomas A. E. Lake, 106

Warwick Avenue, Stratford, Conn.; and Simon Lake, 39 Broad Street, Milford.

Board of Education, Administration Building, Springfield, Mass., plans new multi-unit trade school on 15-acre tract in Blunt Park district, now being acquired. Cost about \$500,000 with equipment. Frank W. S. King, 33 Lyman Street, is architect.

◀ OHIO AND INDIANA ▶

Harris - Seybold - Potter Co., 4510 East Seventy-first Street, Cleveland, manufacturer of printing machinery and parts, has low bid on general contract from Gillmore-Carmichael-Olson Co., 1873 East Fifty-fifth Street, for two-story addition, 36 x 80 ft. Cost about \$40,000 with equipment. Walter H. Smith, 2400 Lee Road, is architect.

Federal Foundry Supply Co., 4600 East Seventy-first Street, Cleveland, has awarded general contract to Sam W. Emerson Co., 1836 Euclid Avenue, for two-story addition, 60 x 60 ft. Cost about \$25,000 with equipment.

Construction Quartermaster, Air Corps, Wright Field, Dayton, Ohio, plans new three-story and basement operating and administration building, 90 x 140 ft. Cost about \$775,000 with equipment. Appropriation is being arranged.

David Archbold, care of Harris Calorific Co., 2828 Washington Avenue, Cleveland, and identified with that company, has let general contract to Gillmore-Carmichael-Olson Co., 1873 East Fifty-fifth Street, for new one-story plant, 100 x 235 ft., at 5500 Cass Avenue, N. W., for manufacture of screw machine products. Cost about \$70,000 with machinery.

Flolock Valve Insert Corp., 604 Peoples' Trust Building, Fort Wayne, Ind., has been organized by Carl B. Thompson and Stephen Murphy, 1825 Fairfield Avenue, to manufacture valve inserts and kindred mechanical products.

Kingston Products Co., 1415 North Webster Street, Kokomo, Ind., manufacturer of automotive products, brass castings, parts, etc., has let general contract to A. J. Wolf Construction Co., 316 Heath Street, Logansport, Ind., for one story addition, 130 x 270 ft. Cost over \$75,000 with equipment.

Ohio Welding & Boiler Works, Cincinnati, recently organized, is now operating at 206 West Second Street. W. M. Schweitzer is general manager.

◀ WESTERN PA. DIST. ▶

United States Engineer Office, Pittsburgh, asks bids until June 28 for one 75-kw. gasoline-electric standby power unit (Circular 411); until July 6, one 75-kw. hydroelectric generating plant for Montgomery Locks, Ohio River (Circular 408).

Gulf Refining Co., Seventh and Grant Streets, Pittsburgh, is considering new oil refinery at Curtis Bay, Baltimore, storage and distributing facilities for new chain of filling stations in this section. Cost over \$200,000 with equipment.

Sun Oil Co., 1608 Walnut Street, Philadelphia, has leased waterfront property of Pennsylvania Railroad at Erie, Pa., as site for new bulk oil storage and distributing plant, with pumping station, steel tanks and pipe lines. Cost over \$100,000 with equipment.

Canfield Oil Co., Coraopolis, Pa., plans rebuilding part of oil refinery recently destroyed by fire. Loss about \$200,000 including equipment.

◀ SOUTH CENTRAL ▶

Brown Stove Works, Inc., Cleveland, Tenn., recently organized with capital of \$200,000 by Grover C. Brown and L. M. Carl, Cleveland, has acquired about 15 acres in northeastern part of city for new plant for parts production and assembling. Initial works will comprise four main units, each one-story, 100 x 100 ft., for foundry and molding department; 40 x 100 ft., for assembling and mounting; 50 x 60 ft. for pattern shop; and 100 x 160 ft., for storage and distribution and office service. Cost over \$85,000 with equipment.

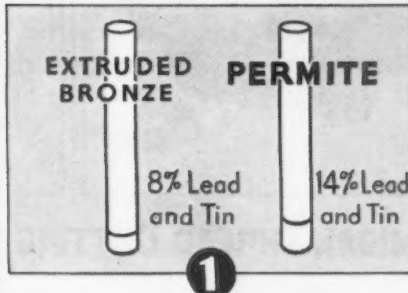
Dowling Brothers Distilling Co., Burcin, Ky., has let general contract to Howell & Goin Co., Frankfort, Ky., for plant additions, including still house, storage and distributing building and other units. Cost over \$80,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until July 1 for six 18,667-kva. power transformers; four 15,000-kva., self-cooled auto transformers; one 45,000-kva. regulating circuit transformer; three 24,000-kva. power transformers, and two neutral grounding reactors and accessory equipment for Norris and Wheeler power plants.

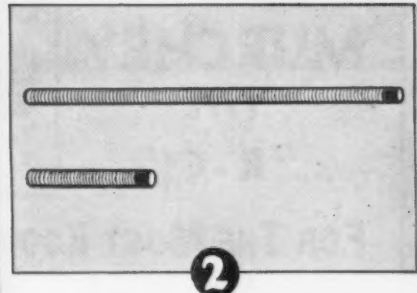
Hill & Griffith Co., 2931 Seventh Avenue North, Birmingham, manufacturer of foundry facings and supplies, is rebuilding one-story plant destroyed by fire several weeks ago. One-story storage and dis-

FOR SPEED PRODUCTION OF BEARINGS AND PARTS . . .

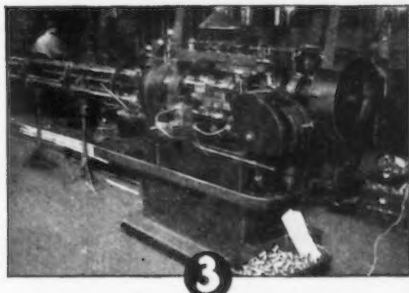
Which of PERMITE'S 7 Advantages mean most to you?



Better Bearing Structure
Permited's high lead and tin content, and its "balanced composition," instill those qualities which mean longer life and less friction. Permited is identical in quality to the finest individual castings.

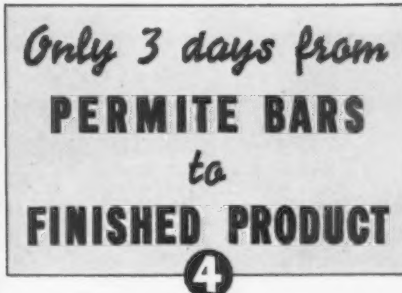


Only 3% Waste for Chucking
Since Permited's 6-foot "speed-length" greatly multiplies the number of pieces that can be made from one bar, there is far less waste of chuck ends.

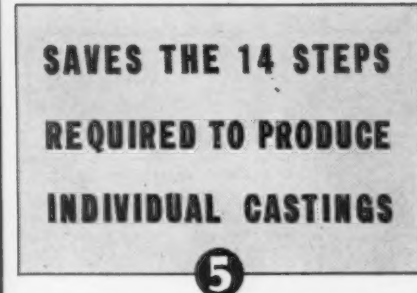


Time Saved in Machining

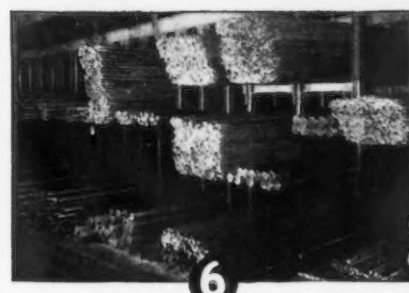
Permited's easy machinability allows maximum cutting speeds. The 6-foot lengths mean more pieces from one bar; fewer machine changes. The wide range of sizes permits the use of a bar identical to or close to the size of the finished part, resulting in a saving in material and machining time.



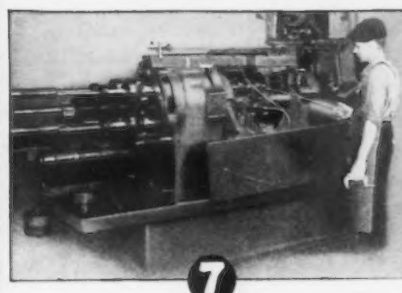
Production Time Saved
The time saved through the elimination of pattern making, casting operations and the machining of individual castings is important to many production schedules. Only 3 days—instead of 3 weeks—from Permited bars to finished product.



Production Costs Saved
The saving in dollars effected by using Permited Bars, instead of individual castings, is considerable. All foundry and pattern costs are eliminated, as is the high cost of handling and machining individual castings.



Warehouse Stocks Available
Prompt service from Ryerson plants supplies Permited to you on short notice. This service, plus the fast production schedule from stock to finished product, enables you to keep your inventory of bars and parts low.



Responsibility Centered on One Man
Many men multiply the chances for error in the production of individual castings. With Permited Bars, all responsibility is centered on one man—the screw machine operator who carries out the complete operation from stock to finished product.

PERMITE

Cast 6 FOOT

Leaded Phosphor

Bronze BARS

Immediately available from Ryerson stock in diameters of $\frac{5}{8}$ " to 2" in steps of sixteenths.

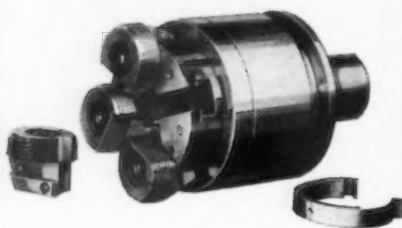
JOSEPH T. RYERSON & SON, Inc. Plants at: { CHICAGO MILWAUKEE ST. LOUIS CINCINNATI DETROIT CLEVELAND BUFFALO BOSTON PHILADELPHIA JERSEY CITY

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TYPE

"R-C"



FOR THE MOST ECONOMICAL THREAD CUTTING

The Murchey type "R-C" is for rotating spindles, but we also make a circular chaser die head for stationary spindles designated as type "R-G." The chasers may be reground to use practically the total circumference. This feature makes the "R-C" die head distinctly a cost-cutting tool, as it produces the greatest number of threads at low cost per screw.

Chasers are ground in the thread.

Regrounding does not impair chasers' accuracy.

All parts are hardened and ground.

Each chaser is adjusted and set quickly by a worm wheel and two worms which also act as a positive lock.

Sizes 7/16" to 2 1/2".

MURCHEY MACHINE & TOOL CO., 951 PORTER ST. DETROIT, MICH.

tributing building is being completed. Entire project will cost close to \$70,000 with equipment. Main offices of company are at 1262 State Avenue, Cincinnati.

Board of Trustees, Morehead State Teachers' College, Morehead, Ky., will soon take bids for new steam power plant and central heating system, with pipe lines, etc.; also for water system. Cost about \$250,000 with equipment. Joseph & Joseph, Breslin Building, Louisville, are architects.

Standard Brake Shoe & Foundry Co., Exchange Building, Memphis, Tenn., with plant and headquarters at Pine Bluff, Ark., has acquired a former mill of Chicago Mill & Lumber Co. near Memphis, as reported in THE IRON AGE of June 6. This plant site, however, comprises 11 1/2 acres instead of 1 1/2 acres as was reported at that time.

◀ SOUTHWEST ▶

Gilbert Brass Foundry Co., 4069 Park Avenue, St. Louis, manufacturer of brass and bronze castings, has taken over one-story building at 5036 Farlin Avenue for new plant unit.

Board of Education, Library Building, Kansas City, Mo., George Tinker, secretary, will soon take bids on general contract for new three-story and basement high school at Meyer Boulevard and Indiana Avenue, to include manual training department. Cost about \$750,000 with equipment. Wight and Wight, First National Bank Building, are architects; Nate W. Downes, Finance Building, is mechanical engineer.

City Council, Hoisington, Kan., has been authorized at special election to arrange bond issue of \$150,000 for new municipal electric light and power plant. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., are consulting engineers.

Walter H. Toberman and C. B. Rader, secretary, Merchants' Exchange, Merchants' Exchange Building, St. Louis, are at head of project to erect a grain elevator at foot of North Market Street. Cost about \$500,000 with elevating, conveying, screening and other equipment.

International Harvester Co., 606 South Michigan Avenue, Chicago, and 104 Jackson Street, Houston, Tex., has let general contract to Knutson Construction Co., Union National Bank Building, Houston, for one-story factory branch, storage and

distributing plant at Houston, 210 x 225 ft. Cost about \$120,000 with equipment.

Lufkin Foundry & Machine Co., Lufkin, Tex., has let general contract to Mosher Steel Co., 3910 Washington Street, Houston, Tex., for one-story addition and improvements in present plant. Cost about \$45,000 with equipment.

◀ MICHIGAN DISTRICT ▶

Michigan Sugar Co., Second National Bank Building, Saginaw, Mich., plans extensions and improvements in beet sugar mills at Lansing, Caro and Saginaw, including additional equipment. Cost over \$75,000 with machinery.

Michigan Gold Mines Co., Ishpeming, Mich., operating properties near city, is erecting two one-story units, 21 x 30 ft. and 21 x 50 ft., as a machine shop and mechanical drying building respectively. A new compressor plant will also be built. Cost over \$40,000 with machinery.

E. G. Guy, Mount Pleasant, Mich., refinery engineer, is interested in project to build a new oil refinery at Carson City, Mich. Initial unit will cost over \$100,000 with equipment.

City Lighting Commission, 174 East Atwater Street, Detroit, plans extensions and improvements in municipal high-tension electric power system, with substation facilities. Cost about \$416,000. Appropriation is being arranged. L. J. Schrenk is general superintendent.

◀ MIDDLE WEST ▶

Libbey-Owens-Ford Glass Co., Nicholas Building, Toledo, Ohio, has approved plans for additions to plant at Ottawa, Ill., and improvements in present buildings, for production of laminated safety glass for automobiles. Cost about \$1,000,000 with machinery. New furnaces will be installed.

Cromwell Paper Co., 4801 South Whipple Street, Chicago, manufacturer of paper products, has let general contract to A. T. Herlin & Son, 6816 Clyde Avenue, for one-story addition, 101 x 270 ft. Cost about \$80,000 with equipment. A. Epstein, 2001 West Pershing Road, is architect and engineer.

United States Engineer Office, Omaha,

Neb., asks bids until June 25 for two steam hoists without boiler (Circular 363).

Common Council, Thief River Falls, Minn., has been authorized at special election to arrange bond issue of \$60,000 for extensions and improvements in municipal electric light and power plant, including new equipment.

American Petroleum Co., Manchester, Iowa, James L. Markwell, district manager, plans new bulk oil storage and distributing plant in Castle Hill district, Waterloo, Iowa, with main two-story building, 50 x 100 ft. Cost about \$35,000 with steel tanks and other equipment.

Quartermaster Depot, 1819 West Pershing Road, Chicago, asks bids until June 24 for 200 two-man cross-cut saws; also for 250 safes for field use (Circular 287).

Mammoth Mines Corp., Twin Bridges, Mont., care of Earl R. Pulver, president, plans new ore reduction plant at gold mining properties about seven miles distant. Cost about \$100,000 with machinery.

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, Neb., plans installation of electric-operated pumping machinery and auxiliary equipment at waterworks station at Florence. Cost close to \$35,000. Financing is being arranged through Federal aid.

Municipal Water Department, Madison, Wis., is preparing bids for one steam-driven centrifugal pumping unit with daily capacity of 4,000,000 gal. for main pumping station; one motor-driven centrifugal pump of equal capacity for East well, and one 1,500,000-gal. per day pumping engine for Nine Springs well. Leon A. Smith is superintendent.

Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., has plans for a \$60,000 addition to finishing room of paper mill.

◀ WASHINGTON DIST. ▶

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until June 28 for socket wrenches, socket wrench sets, valve spring lifters, valve grinding outfits, wrenches, and other tools (Circular 150).

Frank L. Wight Distilling Co., Redwood and Light Streets, Baltimore, has let general contract to G. Walter Tovell, Inc., Eutaw and Monument Streets, for four-story addition at Loreley, 77 x 180 ft., for storage and distribution. Cost about \$100,000 with equipment.

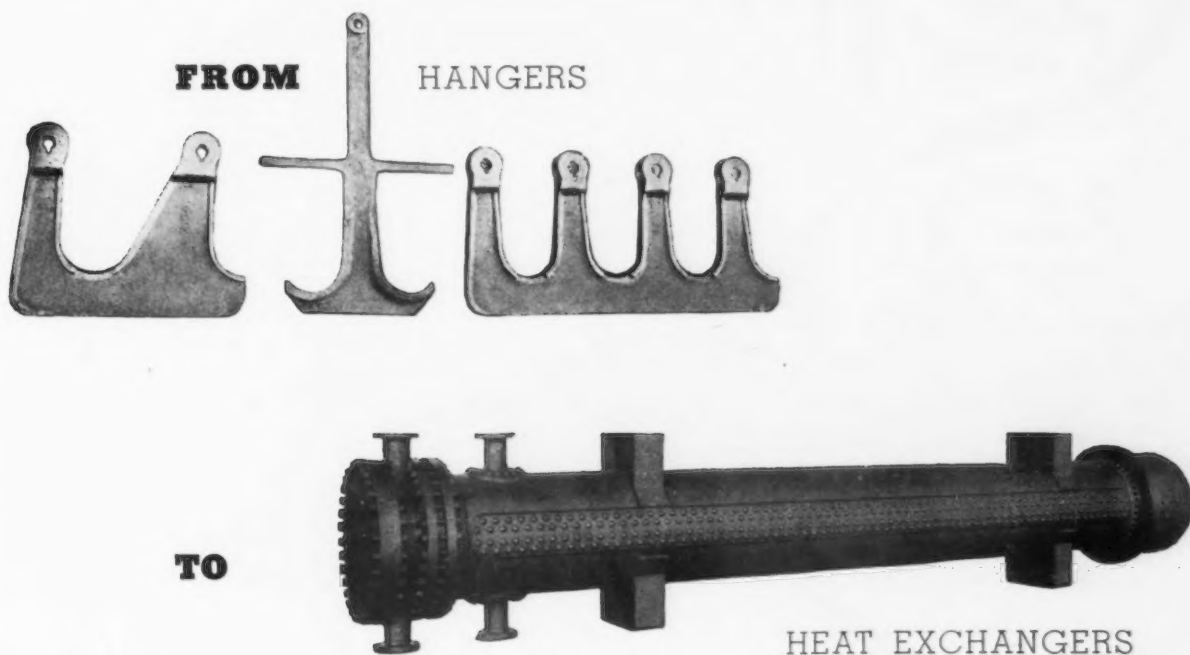
Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 25 for welding rods (Schedule 5822); until June 28, expanded metal, steel (Schedule 5374); until July 2, packing rings (Schedule 5370); until July 26, engines and spare parts (Schedule 900-8398); until July 5, electric cable (Schedule 5371), for Eastern and Western navy yards; until June 25, one fire engine, combination booster tank, pump and hose car for Chelsea Navy Yard (Schedule 5363), one printing press for Charleston Navy Yard (Schedule 5361).

Standard Wholesale Phosphate Co., Mercantile Trust Building, Baltimore, manufacturer of commercial fertilizer products, has plans for one-story addition, 128 x 220 ft., to plant at Curtis Avenue and Aspen Street. Cost over \$45,000 with equipment.

Commanding Officer, Naval Academy, Annapolis, Md., plans extensions and modernization of lighting and power system, cost about \$163,000 with equipment; also new equipment storage sheds, \$24,000; extensions and improvements in sanitation and ventilation systems and facilities, cost \$130,000. Appropriations are being arranged.

Norfolk Shipbuilding & Drydock Co., Norfolk, Va., has acquired property of Southern Shipyard Corp., Newport News, Va., and will remove equipment to Norfolk plant, where expansion will be carried out, with facilities for handling construction and repairs on vessels up to 5000 tons rating. Project will include marine railway to be transferred from Newport News yard. Chesapeake & Ohio Railway Co., Richmond, Va., has purchased real estate of Southern company for expansion in terminal facilities at Newport News.

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Careful investigation of the chromium steels may help you to improve your product or plant. Electromet Metallurgists will be

glad to assist in this study and will furnish without charge the unbiased facts needed to select the most suitable materials. Write for this information today.

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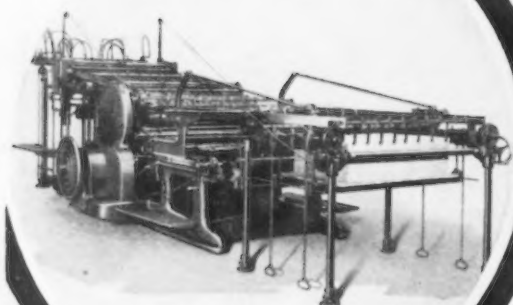
Unit of Union Carbide and Carbon Corporation



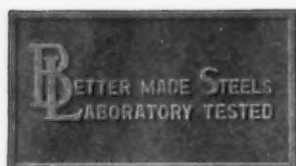
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THE modern printing press—with its maze of rods and wheels and bolts and cogs—is typical of today's high-efficiency machinery that owes its perfect performance to the dependability of cold finished steel shafting.

In every industry, more and more manufacturers are turning to B & L Precision Shafting for those basic qualities that insure better running, longer lasting and easier selling machines. You also can obtain smooth, vibrationless, balanced operation with a minimum of wear on bearings by building your product with B & L Shafting. Furnished in standard or special analysis, and made to close tolerances of size, straightness and concentricity.

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◀ PACIFIC COAST ▶

United States Engineer Office, Post Office Building, Sacramento, Cal., asks bids until June 25 for three drainage pumping plants for Easterly levee, Sutter by-pass, Sutter County (Specifications 6757). Cost about \$450,000.

Armour & Co., South San Francisco, meat packers, plan extensions and improvements in local plant. Cost over \$40,000 with equipment. Arthur Leonard is general manager. Headquarters are at Chicago.

Republic Supply Co., 2122 East Seventh Street, Los Angeles, has plans for new one-story machine shop, 40 x 60 ft., with foundations for a second story later. Henry C. Newton and Robert D. Murray, Architects' Building, are architects.

Bureau of Reclamation, Denver, asks bids until July 1 for steel platforms, railings, grating, cable and bus bar supports, etc., for Boulder power plant, Boulder Canyon, Arizona-California-Nevada (Specification 691-D); until July 8, four 75 ft. x 23 ft. roller gates with operating mechanisms for All-American Canal headworks, same project (Specification 631).

W. P. Fuller Co., 301 Mission Street, San Francisco, manufacturer of paints, oils, etc., has plans for extensions and improvements in building at 700 Fairview Street, Seattle, for new factory branch, storage and distributing plant. Cost about \$60,000 with equipment. John Graham, Dexter Horton Building, Seattle, is architect.

United States Engineer Office, Customhouse, Portland, asks bids until July 9 for gantry cranes and steel gates for spill-

way dam and power house, Bonneville project (Circular 29).

Los Angeles City School District, Chamber of Commerce Building, Los Angeles, has plans for new one-story shop building, 57 x 128 ft., Venice School District. Cost about \$30,000 with equipment. John C. Austin and F. M. Ashley, Chamber of Commerce Building, are architects.

Muscat Cooperative Winery Association, Kingsbury, Cal., C. W. Tremper, president, plans new winery, with storage and distributing facilities. Cost over \$60,000 with equipment.

Constructing Quartermaster, Benton Field, Alameda, Cal., is securing appropriation of about \$3,031,000 for new mechanical and other buildings, and land improvements at local field for new central supply base for Army Air Corps in Pacific Coast area. About \$2,500,000 of fund will be expended for new one-story aircraft machine shop, hangars with repair facilities, supply buildings, quartermaster's warehouse, fuel storage and distribution buildings with pumping stations and tanks, administration building, fire station, dispensary and other buildings, including equipment. Bids will be asked soon.

◀ FOREIGN ▶

Nicaraguan Sugar Estates Co., Ltd., Chichigalpa, near Managua, Nicaragua, plans rebuilding distilling plant recently destroyed by fire. Loss about \$175,000 with equipment.

Ford Motor Co. of Canada, Ltd., Windsor, Ont., has authorized construction of two new plants in Australia, comprising one-story works near Melbourne, for parts production and assembling, to cost about \$600,000 with equipment, and one-story plant near Sydney, primarily for assembling, to cost about \$400,000 with machinery.

Tasmania Paper Printing Co., Ltd., Hobart, Tasmania, has plans for new pulp and paper mill, with power house, machine shop and other mechanical departments. Cost about \$800,000 with equipment. It is proposed to ask bids on general contract in about 60 days.

Ministry of Industry, Government of Mexico, Mexico, D. F., will remodel local Government armament plant for production of agricultural implements and equipment, including plows, harrows, cultivators, etc. Equipment will be installed for employment of about 400 workers.

Public Works Board, Auckland, New Zealand, will receive bids until Aug. 13 for switchgear and electrical control equipment.

Bombay, Baroda & Central India Railway Co., Bombay, India, is planning electrification of portion of line between Borioli and Varas. Cost over \$600,000 with equipment. Engineering department is in charge.

Ludlum Steel Co., at the meeting of its board of directors June 3, declared the regular dividend of \$1.62½ per share on the preferred stock for the quarter ending June 30, payable July 1 to holders of record at the close of business June 24.

Packaging is the title of a new 8 page leaflet recently issued by The Gerrard Company, 2915 W. 47th St., Chicago. The illustrations show various types of tying machines as well as numerous applications for various types of bundles and containers.

Bryant Machinery & Engineering Co., 400 West Madison St., Chicago, has appointed W. G. Nichol Co., 711 W. Michigan St., Milwaukee, exclusive agent in the Milwaukee territory.

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*to meet the rapidly
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PROVED BY 3 YEARS OF USE
IN THE ELECTRICAL INDUSTRY

Not one single complaint in 3 years from
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5719 Ellsworth Ave., Dallas
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Drawn from highest grade
SWEDISH ROD

Catch weight coils . . . exact weight
coils . . . spools or straightened and cut
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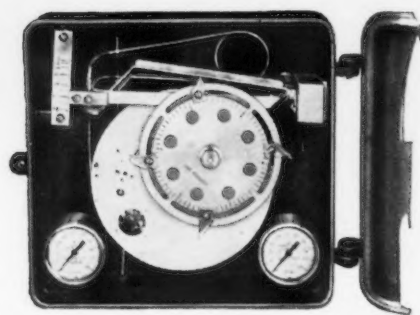
*Laboratory control of all processes
insures uniform quality.*

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WAREHOUSE—1501 BEARD ST.

NEW ENGLAND HIGH-CARBON WIRE CO.
MILLBURY, MASS.

Control Instrument Repeats Single Operation

A NEW control instrument for the automatic, intermittent operation of diaphragm valves or other diaphragm-operated devices is being marketed by Taylor Instrument Companies, Rochester, N. Y. This "Taylor Intermitter" is illustrated below. Its utility is limited to the repetition of single operations. A circular, rather than a fixed, cam is employed and on it the proper number of actuating plugs may be placed; the number of lugs corresponding with



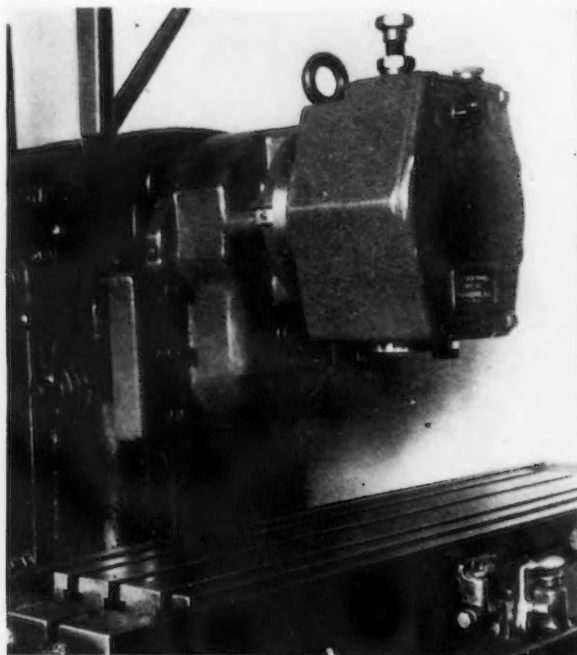
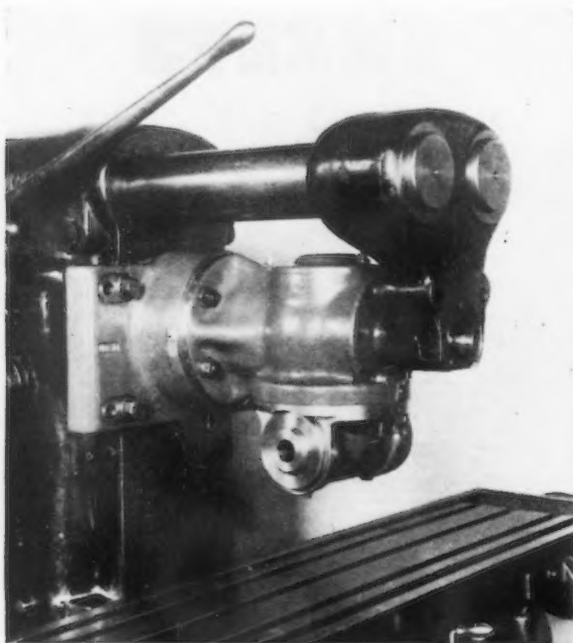
the number of operations during the cycle of the cam. As many as 20 may be used. The duration of each operation is adjustable by moving the bracket which carries the nozzle (upper left corner of case) so that its scribe mark is

Improvements in Production and Shop Equipment

(CONTINUED FROM PAGE 35)

is driven by hardened steel bevel and spur gears. The ratio of the attachment spindle to the machine spindle is 1 to 1. The attachment is suitable for speeds to 1300 r.p.m., and fits all types of Brown & Sharpe machines, standard and high-speed, Nos. 1, 2 and 3 sizes. The spindle can be set at any

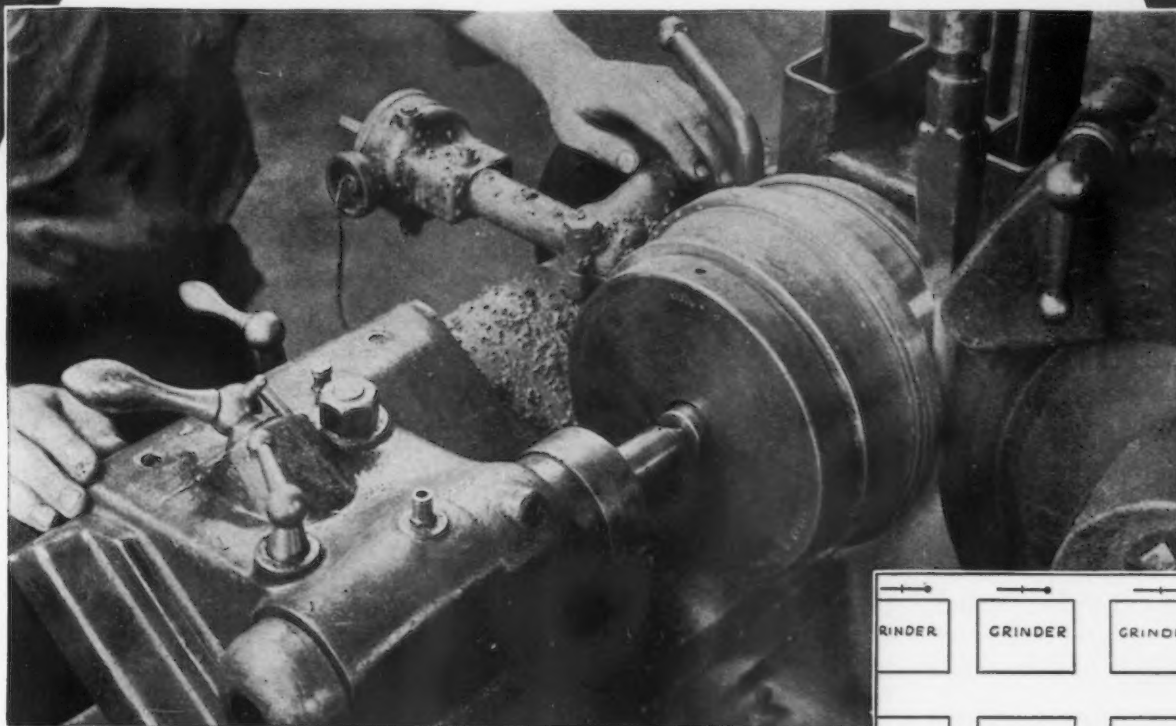
angle from a vertical to a horizontal position; half-degree graduations are provided. A reservoir oiling system provides adequate lubrication for all positions of the swivel head. The spindle end is standardized with a No. 50 milling machine standard hole. Draw-in bolt is employed.



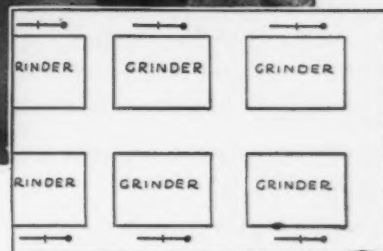
DESCRIPTIONS of these Brown & Sharpe milling attachments begin on page 35, column 3.

BETTER THAN DAYLIGHT

GRINDING OUT PROFITS *with "better than daylight"*



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Even with daylight flooding the shop, operators prefer Cooper-Hewitt light. It rests their eyes, eliminates dark shadows and makes better work, easier to accomplish. There is no glare from polished metal surfaces. Scratches are easily detected. Even the shadows are luminous.

Leading manufacturers in more than sixty different industries have found that rejects are minimized when Cooper-Hewitt light is used. Quality production is maintained throughout

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Think of light as a production tool. Buy it for its production efficiency as all other tools are bought. Select your toughest lighting job. Let us put in a trial installation. Then you be the judge . . . General Electric Vapor Lamp Co., 833 Adams Street, Hoboken, New Jersey.

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IN OLD CARTAGENA



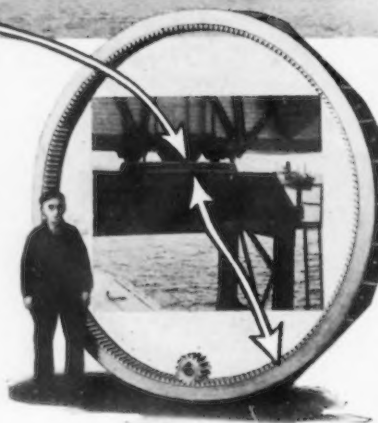
FARREL-SYKES GEARS play their part in handling cargo thru the new port works

In this ancient city of the Spanish Main, principal seaport of Colombia, where the traditions of four centuries blend with the advancements of present-day civilization, the new port works are equipped with every modern facility for the efficient handling of cargo.

For the rotating mechanism of the Lambert-National level luffing gantry cranes Farrel-Sykes precision generated internal spur gears were chosen for their accuracy and smooth-running qualities at high speeds. In an installation over 2,000 miles from the source of manufacture reliability and durability were also deciding factors leading to the choice of Farrel-Sykes gears.

Farrel-Sykes internal gears are generated with either spur or helical teeth and are now available in any size up to 18-foot diameter, 15-inch face and 4-inch pitch. In this development Farrel-Birmingham engineers have narrowed another limitation of gear design and broadened the field of application. Their experience in solving many unusual gear problems may help with yours. You are invited to consult them.

FARREL-BIRMINGHAM COMPANY, INC.
333 Vulcan St., Buffalo, N. Y.



Top—General view of port works at Cartagena built by Frederick Snare Corporation, showing four of the six 3-ton traveling gantry cargo cranes furnished by Lambert-National Division of McKiernan-Terry Corporation.

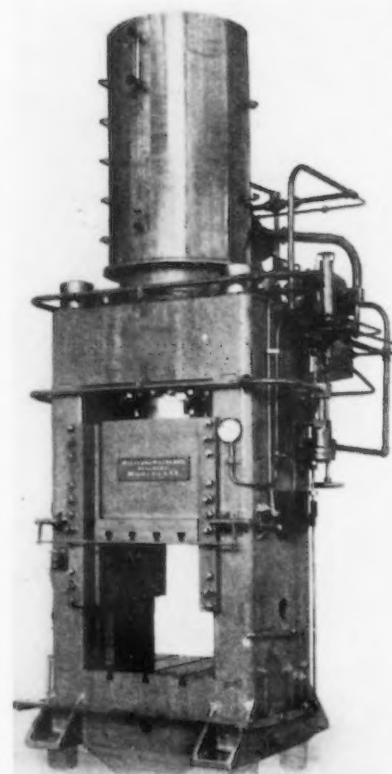
Below—One of the Farrel-Sykes internal gears used for rotating the cranes.

Inset—Close-up view showing internal gear mounted on top of the traveling gantry. It will be noted that the gear is so designed that the rim also serves as a track for the rollers of the rotating structure.

conditions and the nature of the control required. An overpressure release protects the diaphragm motor from excessive pressures in the event of reducing-valve failure. Either compressed air or gas at a constant 25-lb. per sq. in. pressure is specified for efficient operation. The protective case is waterproof, made of non-corrosive aluminum and has black-crackle finish. The pressure gages are located within the case.

Straightening Press Is Fully Foot-Operated

WILLIAMS, WHITE & CO., Moline, Ill., has developed the 750-ton straightening press, shown below, for the machining of large malleable castings. The machine is a self-contained, hydraulic unit of rigid-frame type. Tie-rods are shrunk into place and the ram is guided on the cast housing by



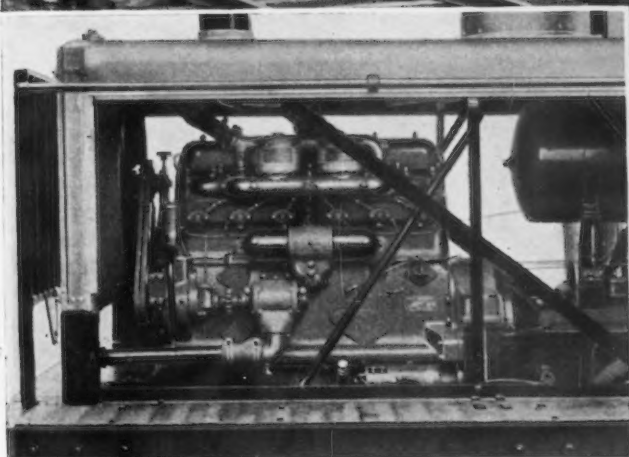
adjustable gibs. Ram control is through foot-treadle and hand-lever operation so designed that a cycle is completed with one depression of the treadle, stopping in the up position. The stop position at the top of the stroke is adjustable for short strokes. An adjustable time-delay is furnished to change the length of dwell under high

opposite the desired time interval given on the scale. This adjustment provides any change in either the number or durations of the operations or of the interval between operations. There is no cutting or replacing of the actuating cam.

The cam is driven by a powerful spring-driven clock which may be 1-, 6-, 12- or 24-hr. periods of rotation. Electrically-driven clocks with identical periods of rotation can be used.

The instrument is available in two types: reverse acting, lugs to close nozzle, applying pressure to diaphragm motor; direct acting, lugs to open nozzle, relieving pressure from diaphragm motor. The instrument may be mounted on any diaphragm motor; direct acting, venient adjacent location. It is possible to operate more than one diaphragm valve or similar device from the same instrument, the number depending upon operating

NEW



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● This new 12-ton Plymouth Hercules equipped straight drive locomotive with the famous Plymouth heavy-duty transmission is licking a tough mile-long material haul at the Carbon, West Virginia works of the Carbon Fuel Company. » »

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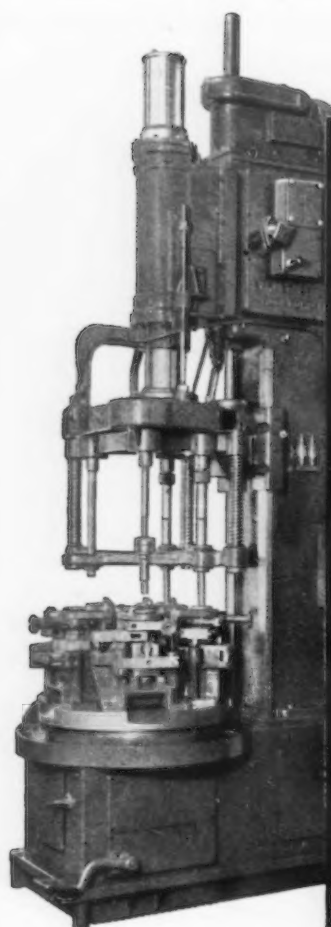
The HERCULES equipped 12 Ton PLYMOUTH

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GET DETAILS**

PLYMOUTH LOCOMOTIVE WORKS

Division of THE FATE · ROOT · HEATH COMPANY · PLYMOUTH, OHIO



NEW FLUID POWER FEEDS

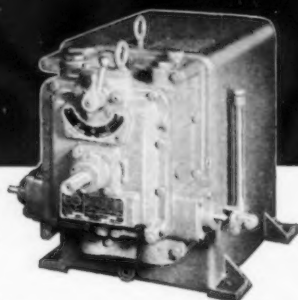
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For Speed Variations Under Temperature and Working Conditions

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Big New Book.
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➤ Above: The Barnes drill, Oilgear Fluid Power Feed equipped, back of the door in the head.

DESIGNERS seeking vastly improved functioning—sales departments eager for winning features—users hunting speed and economy—will get the facts now on Oilgear's revolutionary Fluid Power Feeds.

At right, a new Oilgear Fluid Power Feed. Note: Flanged mounting, as integral machine part . . . Inside pump, eliminating hazard and bettering appearance . . . Self-contained; auxiliary valves, tubing are integral with pump. Many other exclusive features. The OILGEAR Company, 1311 W. Bruce St., Milwaukee, Wis.



OILGEAR FLUID POWER FEEDS

(B-1304)

pressure before the automatic reversal of the ram. Rapid traverse of the slide to and from the work is accomplished by kicker cylinders; an automatic surge valve fills the cylinder during the traverse stroke. The press is capable of 12 strokes per min. Hydraulic pressure is furnished by an Oilgear rotary pump, with an unloading control which permits it to hold full volume until predeter-

mined and preset pressure is reached. This increases the speed of the press cycle. The speed can be changed by adjustment of the volume control. Both are operated from the floor. A safety switch provides that the slide may be immediately returned to the top of the stroke from any position during the stroke. The presses are built in capacities of 200, 300, 450, 600, 750 and 1000 tons.

Dewatering Equipment Utilizes Squeezing Method

A DEWATERING roto-scoop is announced by Link-Belt Co., Chicago, Philadelphia, for recovering fine or coarse sand and similar material. The new machine is capable of recovering available sand grains, of sufficient fineness to meet specifications, and discharging the product dry enough to permit truck transportation, or mechanical conveying to and from storage. It is suitable also for treating materials other than sand, and provides a simple method of saving special grain sizes which are frequently lost in the overflow water. See page 98.

The roto-scoop is a self-contained machine consisting essentially of a larger circular steel tank or container into which the water and the materials to be treated are introduced; a slow-moving power-driven suspended rotating disk to the underside of which are attached inclined adjustable renewable scoops for moving the material within the tank; a curved steel adjustable renewable plow mounted in a stationary position above the rotating disk, for plowing off and discharging the dewatered product ready for use; and the necessary driving machinery mounted above the tank on the same steel supports from which the rotating disk is suspended. The machine is made in four sizes: 15-ft., 12-ft., 9-ft., and 6-ft. diameters, with capacities ranging from 20 to 150 tons an hour, based on material weighing 100 lbs. per cu. ft.

Because the tank is comparatively shallow, and the material feed box and point of discharge at approximately the same elevation, the complete machine requires only minimum head room. The driving unit consists of an electric motor, an incased automatic-lubricating silent chain drive, an inclosed worm-gear reducer, and a pair of spur gears with steel guards, all compactly mounted on a substantial steel beam over and from the steel tank. This design makes up a self-contained unit requiring minimum space and foundations or supporting structure.

The action of the roto-scoop differs from that of other dewatering machines. Instead of dragging the

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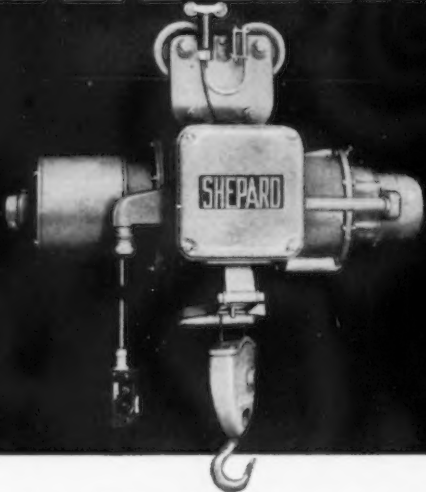
At Mill Supply Dealers and Hardware Wholesalers. Nicholson File Company, Providence, Rhode Island, U. S. A.


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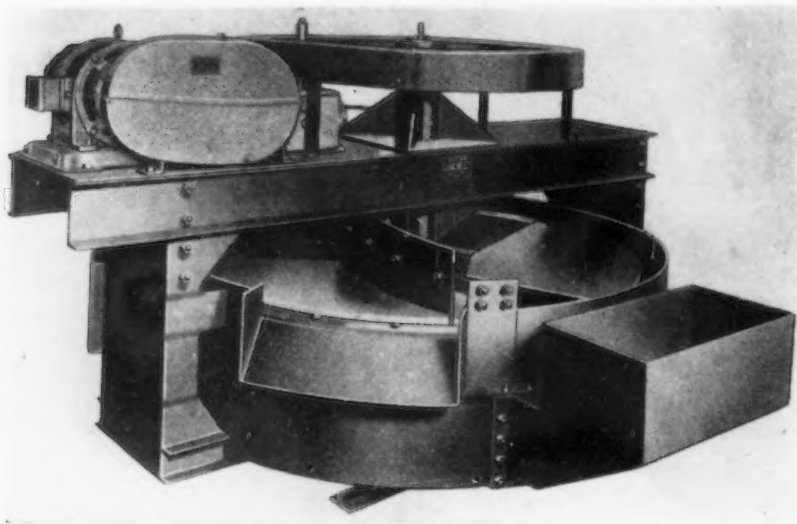
ELECTRIC HOISTS

Exclusive features: 1. Balanced Drive, at two points diametrically opposite. 2. Perfect alignment, maintained by all parts rotating around a common axis. 3. Automatic Oil Bath Lubrication. 4. Control by rope, push button, outrig or controller for every hoist. 5. Precision variable speed control for both A.C. and D.C. 6. Variety of speeds, types, lifts and capacities precisely suited to any service. *Write for complete data.*

SHEPARD NILES CRANE & HOIST CORP.
356 Schuyler Avenue, Montour Falls, N. Y.

material up an incline and depending upon gravity and a time period to drain the product, the rotating scoops force the material above the water, through openings in the revolving disk to which the scoops are attached, and in so doing, compress the material so that the

water is effectually squeezed out. In addition, there is some gravity drainage while the rotating disk carries the material around to the discharge plow, the circular shape of which serves to further squeeze, drain and dry the material before it is discharged as fully treated.



TEXT covering this Dewatering equipment, manufactured by Link-Belt Co., begins on page 96, column 3.

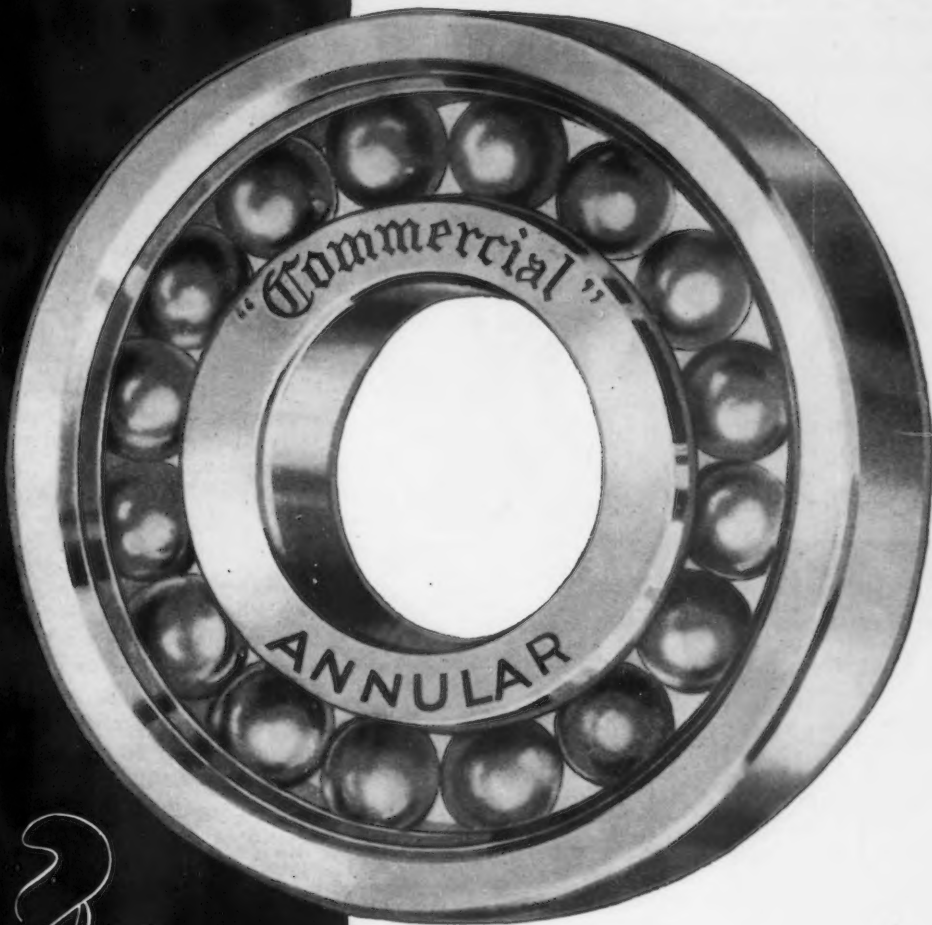
Factory Employment Off in New York

THE usual seasonal decrease in employment occurred in New York State factories from the middle of April to the middle of May. Total employment decreased 1.4 per cent, while total weekly payrolls dropped 2.4 per cent. According to the industrial commissioner, Elmer F. Andrews, decreases in both employment and wage payments are to be expected at this season of the year; the usual changes, as shown by the average movement for the last 20 years, are decreases of 1.3 per cent in employment and 0.6 per cent in payrolls. The decrease in the number of persons employed this May followed a slight increase in April, whereas the usual March to April change is a decrease of about one per cent. Seasonal curtailment in the clothing industries accounted for most of the decline. Further seasonal gains in employment were noted in structural and architectural iron plants and glass, paints and colors factories as well as in brick and cement plants.

Wages and Hours on Government Contracts

THE Administration bill designed to carry old code wages and hours in all Government spending contracts is soon to be laid before congress provided means are found of overcoming difficulties over application of applying wage and hour regulations to manufactured articles not existing when restrictions are set forth for building contracts. This difficulty of reconciling code hour and wage provisions as to Government contracts with commercial practices has been present for many years and Government lawyers now are pointing to an act of 1912 when Congress specified that laborers and mechanics on construction contracts should not work longer than 8-hr. a day, but with no restrictions as to employees under transportation, communication or supply contracts. By reason of this exemption the opinion is expressed that the Government cannot by executive order establish hour and wage regulations for supply manufacturers, despite the fact that it was because of this exemption that the President has asked for the new legislation. The legislation was suggested as the result of the Supreme Court decision invalidating NRA.

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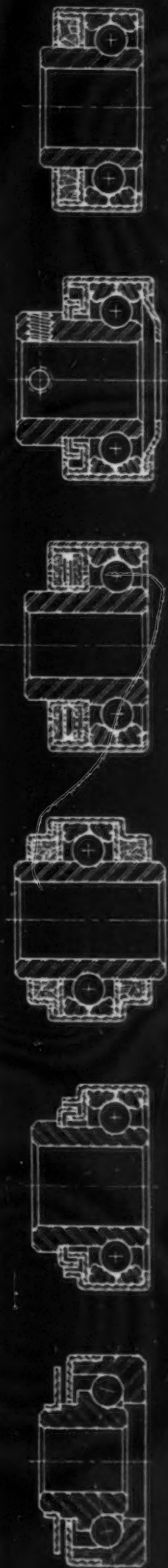
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IN YOUR PLANT**

Grinding Facilitates Production of Accurate Machine Tool Parts

(CONTINUED FROM PAGE 15)

Whitney surface grinder arranged for finishing the outer surface on a cast iron turning head. This part is approximately 13 in. long and 7 in. wide. The work is held in a special fixture which, in turn, is mounted on the magnetic chuck with which the machine is provided. This machine is fitted with an aloxite wheel 14 in. in diameter, 30 grit, S grade, operated at a rim speed of 5000 ft. per min. The chuck speed is 30 ft. per min. The object of this grinding operation is to generate a level surface from which the work is located for subsequent operations.

Spline Shafts Finished on Special Equipment

In a number of grinding operations special equipment must be used. This is true of the spline shaft shown at the right in Fig. 8. As the three splines project above the body, the body is finished on a Landis grinder fitted with a cam grinding attachment. The cam action lets the wheel in to grind each of the three body sections and withdraws it to pass over the splines. This shaft is 13½ in. long with a

body diameter of 1½ in. As the three-section surface finished by grinding cannot be measured with ordinary micrometers, a three-point special micrometer is used. This is shown at the center in Fig. 8, while the gage for setting the micrometer is shown at the left.

As previously stated, many sur-

faces must be finished with no plus or minus tolerances. On first thought this appears to be a costly procedure as the grinding machine operators must proceed with great care in maintaining the necessary close sizes. However, time is saved in the long run as assembly of the various parts thus finished is expedited. Where the plus or minus allowances are permitted, the parts must be assembled by selective methods. That is, an undersize shaft must be fitted to an undersize hole. This consumes time. Further, if the part is oversize a slight amount, say 0.0003 in., the hole it fits must be reamed or the part filed or polished down, which adds expense to the assembly cost. Thus, if the parts are finished to exact dimensions, assembly is expedited. Also, parts thus finished fit perfectly when sent out for replacements.

To facilitate setting of micrometers where the work must be held to exact dimensions, a set of standard sizes arranged in a cast iron holder is used. The set shown in Fig. 9 consists of nine gages ranging in diameter from 1¼ to 2¼ in. Arranged in this manner, each gage is ready for instant use and positioned so that it is a simple matter to obtain the necessary micrometer reading. Thus, if the workman's micrometer is slightly off from a given standard, he can finish the parts to the necessary dimension as he transfers the size from the standard gage to the work with his micrometer, which in this case is used simply as a transferring tool.

Conference Board Finds That Machines Make Jobs

TO discuss temporary displacement of labor by machines and not to consider the creation of employment opportunities by machines is an unsound method of analyzing the social and economic effects of technological progress, says the National Machine Tool Builders Association on the basis of studies now being made by the National Industrial Conference Board.

The Conference Board is making a survey of mechanization in industry and technological progress for the machine tool group with a view to showing the part the machine has played in our national

economic progress. Upon completion, the study probably will be the first comprehensive survey of the kind.

"Ever since the dawn of the industrial revolution," says the Association, "mechanization of industry has been denounced by some writers as the greatest problem concerning labor. From the early nineteenth century, when the textile industry was first organized on a more mechanized basis, causing temporary loss of employment to thousands of weavers, to this day when automatic motion has taken the place of hand and semi-auto-

THERE'S A SWING TO ALUMINUM

SCREW MACHINE PRODUCTS



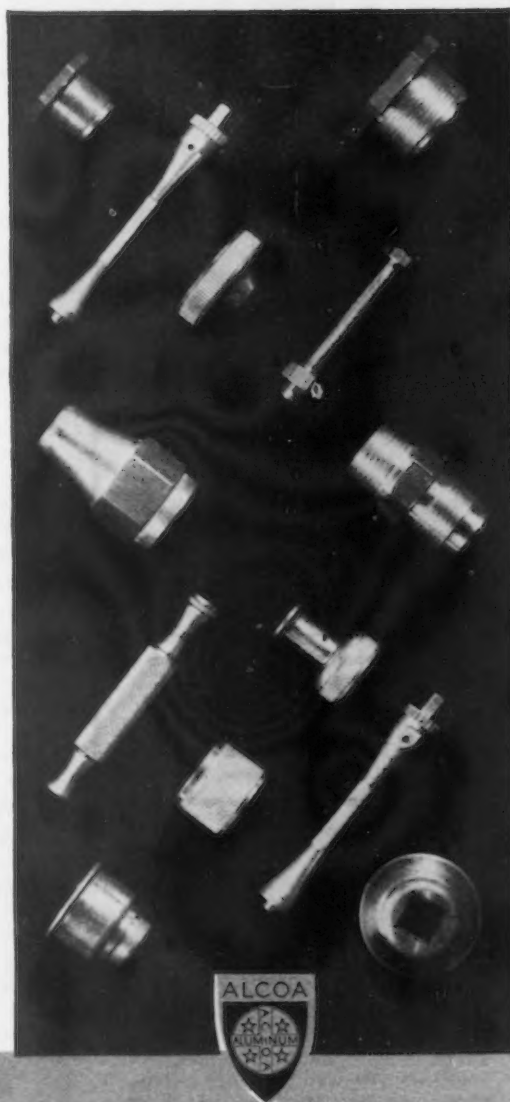
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● Part of the reason for all the new parts being specified in Alcoa Aluminum is increasing recognition of the special qualities of Aluminum. Many a part operates more efficiently because Aluminum is lighter in weight. Many a part lasts longer because Aluminum resists corrosion.

But back of that is the discovery of many production men that there are some new angles to the per-piece cost of Aluminum Screw Machine products.

Machining costs are being slashed by advanced techniques. Delivery schedules are helped by overnight availability of real working stocks, comprising all standard rounds and hexes.

May we suggest how to get aboard this trend to Aluminum Screw Machine Stock? Remember first that a pound of Aluminum gives you three feet of stock for every foot you get out of a pound of the heavy metals. Then ask us to show you how many operators are reducing their per-piece costs by using the latest facts. If you buy screw machine parts or products, ask your supplier to do just that. It will mean dollars and cents to you. ALUMINUM COMPANY OF AMERICA, 1885 Gulf Building, Pittsburgh, Pa.



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628 N. Mechanic Street, Jackson, Michigan

matic operation, permanent technological unemployment has been prophesied as an inevitable result of the machine age. Instances have often been cited as evidence of such contentions, where one or another machine would supplant the use of five, ten, fifty or one hundred workers; or, conversely, when one worker, with the help of a machine, could produce five, ten, fifty or one hundred times as much as he could prior to the installation of his mechanical assistant. The usual and misleading inference from such

statements is that mechanical devices throw permanently out of work as many persons as they displace. Since the machine has by now entered into almost every phase of our industrial life in one form or another, the illusion of labor displacement by technology is multiplied, and thus mechanization becomes in the minds of many not only the foe of labor but a menace seeking the destruction of labor as a factor of production.

Working Population Gaining in Ratio

"To those who so vehemently resent and attack the introduction of machines it must seem somewhat odd that since 1870 the increase in the working population was about one-third greater than that of the total population, and that despite that fact there was proportionately no more unemployment during the twenties than at the turn of the century or before. It must be even more puzzling that during this period labor as a group received a growing share of the national income and that real wages showed a marked increase.

"These facts alone seem to throw much doubt on the theory of technological unemployment. If machines permanently displace labor, how is it that our economy showed relatively no greater unemployment from 1921 to 1930 than in similar periods thirty years ago?

"Labor economies are instituted for the same reason as the majority of reforms in business—the desire to increase the profitability of the undertaking in order to provide assured existence of the enterprise and continued employment of its personnel.

"When the installation of a labor saving device makes possible a decrease in the price of the finished product, the scope of the market for the product is as a rule increased. It brings the article within the price range of a wider market and as a result more units are sold.

"The automobile industry is an outstanding illustration. If the cost of the average car were about \$5,000, the market for it would be definitely limited because of its high price. However with the average price only one-tenth of that sum, about \$500, not only are ten times as many people able to buy automobiles, but the market is increased twenty or even thirty fold. A good portion of the population in the lower income groups which comprises the bulk of the people, can afford to own a car, and some people buy two or three of the less expensive ones.

"If it is assumed that the price

reduction was made possible through the utilization of labor-saving machinery alone and that the labor force was cut to about one-tenth of the former force, those who were displaced could readily be reemployed and additional workers hired in order to fill the increased orders.

Besides the large employment created in the direct production processes, more auxiliary labor is required to handle the large volume of business in the sales, bookkeeping, shipping, and other departments within the plant. Allied industries likewise received a stimulus in production in order to meet the demand for additional raw materials, power, more adequate transportation facilities, and so on.

A "Fanlike Movement"

"Thus machines, by decreasing cost prices, stimulate sales and effect a fan-like movement of employment spreading throughout innumerable fields of our industrial system.

"The degree to which this employment movement will take place depends upon a multitude of factors; such as the character of the goods produced, the elasticity of demand, the relation to allied industries, and so forth.

"This brief survey of what happens when an industry becomes more mechanized is not intended to deny that machines cause temporary displacement of labor in many cases while the process of readjustment is taking place. But that is not technological unemployment, i.e., unemployment of permanent character. Only, if mechanization, considering its effect on employment and unemployment, results in a net increase in the proportion of unemployment in our working population may machines be justly indicted as creators of a permanent problem of unemployment, i.e., technological unemployment.

"The temporarily displaced labor is in time absorbed either in the same plant, occupation, or industry, or it is shifted into other fields where employment opportunities have been created by virtue of technical advancement. Workers so affected are suffering intermittent unemployment, just as the sick who are unable to work, those who are unwilling to work, and the workers who are laid off during the renovation of a factory in which they happen to be working.

"Therefore, to discuss temporary displacement of labor by machines and not to consider the creation of employment opportunities by machines is an unsound method of analyzing the social and economic effects of technological progress."